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# *The Journal of General Education*

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# *Editorial Comment*

IN HIS recently published novel, *Nineteen Eighty-four*, George Orwell, the English critic, portrays a horrendous "civilization" thirty-five years hence, when freedom of thought has been extinguished. The language of the country portrayed, Oceania, is *Newspeak*, a bastardized version of *Oldspeak*, i.e., English, in which words have only a single state-approved meaning and abstract conceptions have all but disappeared. The ruling party, having successfully inculcated the inhabitants to the point of blind acceptance with the slogans WAR IS PEACE, FREEDOM IS SLAVERY, and IGNORANCE IS STRENGTH, demonstrated to a high degree that the intellectual dehydration of the language and the destruction of all printed material not issued by the Ministry of Truth (called *Minitrue* in Newspeak) facilitated the maintenance of the slave state. Most "old" books and historic written discourse could not be translated into Newspeak because the ideas involved were unknown to the inhabitants, who spoke and read only Newspeak. Thus the following passage from Thomas Jefferson's First Inaugural Address (March 4, 1801) would not be translatable into Newspeak:

> But every difference of opinion is not a difference of principle. We have called by different names brethren of the same principle. We are all republicans—we are federalists. If there be any among us who would wish to dissolve this Union or to change its republican form, let them stand undisturbed as monuments of the safety with which error of opinion may be tolerated where reason is left free to combat it. I know, indeed, that some honest men fear that a republican government cannot be strong; that this government is not strong enough. But would the honest patriot, in the full tide of successful experiment, abandon a government which has so far kept us free and firm, on the theoretic and visionary fear that this government, the world's best hope, may by possibility want energy to preserve itself? I trust not. I believe this, on the contrary, the strongest government on earth. I believe it is the only one where every man, at the call of the laws, would fly to the standard of the law, and would meet invasions of the public order as his own personal concern.

This passage would be transcribed, or rather characterized, in Newspeak as *crimespeak*, i.e., a nonorthodox expression of ideas not approved by the state as true. The school children in Mr. Orwell's mythical country portrayed in *Nineteen Eighty-four* could not grow up to be good citizens because they would not be allowed to see or hear anything which was not state-sanctioned *goodthink;* they would have teachers whose ideas were the same as everybody else's.

Thomas Jefferson's First Inaugural Address would be **verboten** or запрещенно in the Oceania of *Nineteen Eighty-four*. It was quoted in the American press this spring, with all its force and varied meaning, by two commentators on the current attacks upon independence of thought, teaching, and associations by government (federal, state, and local), by private groups, and by self-styled "patriots" and super-Americans. The last sentence in the Jefferson passage reproduced above—"I believe it is the only one where every man, at the call of the laws, would fly to the standard of the law, and would meet invasions of the public order as his own personal concern"—was used by Henry Steele Commager, Professor of History in Columbia University, in his article, "The Real Danger—Fear of Ideas," in the *New York Times Magazine* (June 26, 1949). Jefferson's sentence, "If there be any among us who wish to dissolve this Union or to change its republican form, let them stand undisturbed as monuments of the safety with which error of opinion may be tolerated where reason is left free to combat it," was used by Robert M. Hutchins, Chancellor of the University of Chicago, in his June convocation address, "What Price Freedom?" which has been reproduced in full-page advertisements of the International Latex Corporation in metropolitan newspapers from coast to coast (see, e.g., *New York Times*, June 29 and July 7).

Mr. Commager, after enumerating the various manifestations of the current hysteria against inde-

pendent thought and traffic in ideas, charges that "the current program of suppression seriously endangers effective operation of our democracy." This program, he continued,

> imperils freedom of teaching in elementary, secondary, and higher schools by requiring conformity in standards, by introducing the grave peril of censorship of textbooks and ideas, and by driving away from the teaching profession men and women of independent minds. It creates an atmosphere in which teachers find safety not in orthodox ideas—for they will never know surely just which ideas are orthodox—but in no ideas. In the end we will get a generation of children taught by teachers who are afraid of ideas. Such children cannot grow up into wise and competent citizens. The current program threatens the right and the necessity of criticism. No government can operate successfully without criticism, and no government that tries to distinguish between "safe" and "subversive" criticism will get the kind of criticism that it needs.

Mr. Hutchins concluded his address with this charge:

> How is the educated man to show the fruits of his education in times like these? He must do it by showing that he can and will think for himself. He must keep his head, and use it. He must never push other people around, nor acquiesce when he sees it done. He must struggle to retain the perspective and the sense of proportion that his studies have given him and decline to be carried away by waves of hysteria. He must be prepared to pay the penalty of unpopularity. He must hold fast to his faith in freedom. He must insist that freedom is the chief glory of mankind and that to repress it is in effect to repress the human spirit.

The *Journal of General Education* is not the most appropriate forum for the discussion of many of the facets of the issues of academic freedom and thought control. But, since the period of organized general education is the period in which the schoolman has his role to play in the training of young men and women to assume citizenship, it is appropriate to comment on the attack on ideas which is so widespread in the United States today. General education cannot be concerned only with safe, i.e., orthodox, ideas in science, politics, or literary criticism. General education cannot tolerate the censorship of textbooks, as was attempted in California and elsewhere of Lorie Tarshis' *Elements of Economics: An Introduction to the Theory of Price and Unemployment* (Cambridge, Mass.: Houghton Mifflin Co., 1947). General education cannot stand to have teachers and prospective teachers driven away from the profession because they support, or even only inquire into, unpopular ideas (see, e.g., the case of Brent D. Allinson, Hugh Bone, and Cecil Crews, discussed in Howard K. Beale, "Freedom for the School Teacher," *Annals of the American Academy of Political and Social Science*, November, 1938).

General education will cease to be education if the students and teachers have to memorize one of the government-approved "easy tests" for detecting a Communist-front organization: "Does the organization have a consistent record of support of the *American viewpoint over the years?*" As Jefferson said, "this government" is "the world's best hope"; but when he said in the same paragraph, "every difference of opinion is not a difference of principle. . . . We are all republicans—we are federalists," he was speaking at a time when the republic was sharply divided on many critical issues of government, including taxation, character and size of the national defense, and foreign policy. In short, what was the American viewpoint in 1801?

General education, to paraphrase Mr. Hutchins, must produce citizens who can and do think for themselves. General education must give its products a perspective and sense of proportion which will enable them to withstand hysteria and thought control. General education must create a faith in freedom by demonstrating through its courses of study that man can be free. This general education can do by advancing the understanding of the nature of the world and man and by developing critical and inquiring reason.

* * *

The education of citizens requires good teachers. Their teaching must be open to criticism. Criticism must be honest and to the point of teaching. In Mr. Beale's article, "Freedom for the School Teacher," mentioned above, note should be made in several of the cases of persecution that the teacher's superiors testified that the individual concerned was an "excellent" or "corking good" teacher. What these individuals were criticized for were such occurrences as: using the Russian [*sic*] term "Nazi" about Germans in 1934; studying the Declaration of Independence; setting aside a day in the social science class in 1932 to discuss the views of Hoover, Roosevelt, and Thomas; using the *Manchester Guardian*, the *Christian Century*, and the *New Republic* in class. Such criticism and the consequences which followed in the recorded cases cannot

strengthen the teaching profession or improve the quality of instruction. Such criticism is dangerous to American democracy.

The criticism of teaching which appears in Paul Klapper's article on "The Professional Preparation of the College Teacher" in this issue of the *Journal* is of a different order. The kinds of criticism put forward by the distinguished retired president of Queens College will be helpful to the profession and to those whose task is the preparation of college teachers. Mr. Klapper's self-examination about what he had done in describing actual hours in the classroom and lecture hall should be recorded. He wrote the Editor:

> I have been visited by doubt about the publication of these summaries of college hours. Do you think I am hitting my fellow teachers under the belt? I have been faithful and, I believe, more lenient in my judgment than these instructors would have been with themselves. I have blanketed them with anonymity and done all the decencies. Without these "vignettes," I am left protesting and pleading; with them, the point is made with no special protest or plea. Hamlet knew how to teach his mother a lesson when he invited her to look upon this picture and that.

The teaching profession can understand such criticism; it does not react the same way that it does to demands for textbook lists by the House Committee on Un-American Activities.

Sir Walter Moberly, the Chairman of the British University Grants Committee, in his article on the "Aim and Basis of the University" in this issue, raises the problem of objectives of education to its proper level when he says:

> If our universities are to rise to the height of the times, the first, and quite inescapable, requirement is that they shall concentrate far more attention on the deep and difficult issues of the day. There must be no more tacit conspiracy of silence. Convictions must be explored and tested to their roots. Next, communication must be re-opened. Contact must be made and the issue must be joined, not at the ordinary level of debate, but at the level at which convictions are really formed.

Joseph J. Schwab, in his discussion of the nature of scientific knowledge in this issue of the *Journal*, demonstrates the variability of approaches in science and, among other points made, indicates the importance of discussion—as opposed to "political debate"—on differences in the sciences. Richard McKeon, in his article on "The Nature and Teaching of the Humanities," premises his discussion with the statement that problems of education relevant to any subject matter are determined *in part* by the problems of the times and in part by the knowledge available. He then says:

> So far as history is concerned, it is obvious that the circumstances of man have undergone radical changes and that the knowledge of man is vaster than, and different in character from, earlier expectations and dreams; but it is also obvious that the fundamental nature of man, the values that he seeks, and the conditions of truth that determine all deliberate planning are unchanged and that the great achievements of the past are examples and guides for the present and the future. So far as principles are concerned, the complex development of experiment and dispute is at least clear enough to leave no doubt that arguments in favor of doctrines or practices advanced on grounds of novelty suited to new conditions (in which false distinctions between classes of men, faculties of mind, theory and practice, thinker and subject, have disappeared) are no more recent or conclusive than arguments advanced on grounds of tradition suited to fundamental principles of human nature and morals (in which reliance is put on reason, human achievement, and the unchanging regularities disclosed in science).

The authors of all the articles in this issue are concerned with the problems of general education in our time. They approach the problems from different "viewpoints." They represent the best Anglo-American educational tradition of free inquiry and full discussion of important issues.

REUBEN FRODIN

# *The Professional Preparation of the College Teacher*

PAUL KLAPPER*

THE PROPOSALS for improving the quality of college teaching in this article are an outgrowth of a more comprehensive study that was undertaken into the changes that have been forced upon liberal arts colleges by controlling circumstances of the time. To those engaged in general education, methods of achieving a high quality of instruction have a special significance because the motivations of their students do not stem from vocational considerations.

The assumptions on which the initial inquiry was based are three: that enrolments in posthigh-school education will continue higher than prewar levels and high enough to tax the present facilities of our best institutions; that the present teacher shortage will continue for at least another five or six years; that strained budgets will become even less adequate in both private and public institutions because of inflationary trends, diminished returns on investments, and the decreasing ability of private bounty to support higher education.

Proceeding on these assumptions, the inquiry sought to ascertain what changes have been forced on (1) curricula, (2) teaching procedures, and (3) student counseling. The study limited itself to those changes which institutions of higher learning were compelled to make because of the three pressures set forth above and gave only passing attention to those significant changes which followed a reformulation of the purposes of higher education or a refinement of existing programs of study. Among the questions asked were the following:

* President Emeritus of Queens College; Chairman of the Committee on Coordination of Teacher Education, College of the City of New York.

What courses, activities, or practices, held especially valuable by the faculty, have been discontinued because of excessive enrolment, teacher shortage, or limited budgetary provisions?

In what courses or activities, in which individual and small group conferences with students are deemed necessary, have such conferences been seriously reduced or eliminated?

In what courses, in which laboratory or similar activities are deemed valuable, have the laboratory features been seriously reduced or eliminated?

What courses designed to develop specific skills—for example, English composition for Freshman or a course in conversation in a foreign language—can no longer achieve their purposes because class enrolments now make individualized attention almost impossible?

What is the average size of a recitation class in mathematics or English literature?

How large are the lecture groups?

Can the library meet the demands made upon it?

How well do instructors know their students? Can they characterize the intellectual reactions of their students? Do teachers of recitation and discussion sections know their students as well as an instructor of a correspondence course knows the mind of a student with whom he has exchanged twenty assignments and criticisms?

How frequently do teachers of the same or related courses meet to discuss the improvement of instruction and the technique for appraising their work as teachers?

What changes have been made in the postgraduate programs of those candidates for the doctorate who hope to become college teachers?

What supervision of teaching is assured assistants and young college instructors?

Have abnormally large enrolment and teacher shortage forced changes which may be considered improvements over prewar educational procedure?

What was the teacher-student ratio before the war? After the war?

What is considered a normal teaching assignment for those in professorial ranks? In subprofessorial ranks?

What reductions in teaching assignments are made for the productive scholar and the creative worker in the arts?

Through such questions asked of administrative officers, senior members of the faculty, and young instructors, an attempt was made to gauge the effects of the three basic pressures under which institutions are compelled to operate today. Not more than one-quarter of the two or three weeks spent at each of six large institutions enjoying enviable reputations was devoted to these conferences. About three-quarters of the time went to visiting classes, for here the educational planning of an institution is translated into reality. Generally speaking, the actual achievement of a college, an undergraduate institution, does not rise appreciably above the level of class performance. The responses to the questions listed above and the impressions gained from actually visiting classes will be supplemented by the results obtained from a questionnaire sent to a selected number of institutions—about twenty. This paper limits itself to one aspect of the total study: the quality of instruction and how to improve it.

The purpose is not to present an exhaustive statistical study but rather to organize the intimate impressions of the quality of instruction during the current academic year in institutions that are both representative and large. An earnest attempt will be made to present an over-all impression and to suggest corrective programs that are both simple and practicable.

On the whole, we are justified in characterizing the gap between educational intent and actual achievement as wide and discouraging. The keenness of the disappointment stems from the fact that the conditions responsible for this wide gap are not new and not necessarily associated with the pressures of the day, but rather with circumstances that have unfortunately prevailed for many years. The large classes, the inexperienced teachers, the long teaching day, the heavy teaching assignments—these are not the primary causes of ineffective teaching in our colleges and universities today; rather, they are the secondary causes that have intensified it. The fact remains that our teachers in institutions of posthigh-school levels have not been prepared to teach. We have persisted in the assumption that good teachers are born, hence cannot be made, and, further, that anyone who really knows can teach because the converse—he who does not know cannot teach—is true. Experience repeatedly refutes the comforting hope that he who knows can teach. After visiting three or four classes a day in representative institutions over a period of twelve weeks, it became apparent that born teachers are few and that those who know and want to teach can be helped to a very acceptable level of competence.

Aimlessness is the most important single cause of ineffectiveness in teaching and of frustration of educational effort. Again and again one looks in vain for evidence of purpose in classroom, lecture hall, and laboratory. The only apparent purpose that the observer can discover in these visits is to fill the interval from bell to bell with another segment of the subject matter of the course which the student—being literate—can and should acquire for himself. In the wake of this purposeless procedure come habits of mind and of work decidedly deleterious to both student and teacher, for neither is exerting his best creative effort.

For illustrations we may turn to a series of thumbnail sketches of procedures in classrooms and lecture halls. With two exceptions, they are representative, not of the best and surely not of the worst, but of the hours that occur most frequently in a student's weekly schedule. The sketches are photographic and the appraisals are deliberate understatements in order to make allowances for unusual or adverse conditions that may not have been apparent to the observer.

LECTURE NO. 1

*The course.*—Introductory economics, 3 lectures and 1 recitation weekly.

*Grade.*—A Freshman-Sophomore course.

*Size of class.*—About 650–700; floor and gallery of a large auditorium well filled.

*Subject of the hour.*—Relation of the Federal Reserve Bank to some functions of local banks.

*Content.*—Meaning of reserves; 3 kinds of reserves —primary, secondary, and legal; description of mechanisms for expansion and contraction of currency and credit through the actions of the Federal Reserve. The usual material found in any number of books and pamphlets, but well said. Repeated references to: "on pages $x$ or $y$ or $x$ to $y$, I explain. . . ." Clearly, this was a repetition of the text; the students said so; and, when one student asked another a question designed to fill a

gap in the former's notes, the latter assured him that he would find the "stuff" in the text.

*Method.*—Lecture, with an occasional question to the entire auditorium calling for a one-word answer—"yes, no, 4%, Chicago," etc. Outline on board was placed there before class arrived but could not be read by at least 60 per cent of the audience because the board and hence the writing were too small.

*The instructor.*—An effective speaker; voice, mannerisms, and occasional questions in lieu of declarative statements, are all designed to keep a group listening. His illustrations were simple, concrete, and taken from prevailing local activities. He repeated the same ideas frequently, but the adequacy of his vocabulary made each repetition sound different.

The instructor is an experienced hand and has probably been giving these lectures for years. The material *may* be in mimeographed form, peddled openly or surreptitiously by enterprising students.

*Student reaction.*—The class began with a cheer; evidently the instructor is a tradition on the campus. At the beginning all were quiet, but even after the first few minutes evidence of inattention was obvious. Some read a text, some *the* text, some a newspaper, others the student paper. Here and there students did nothing but gaze drowsily into the air. Only one out of three took any notes. In the second half of the hour, there was considerable conversation, orderly to be sure. Many seemed confused by such terms as "custodianship of reserves," "rediscount," "commercial paper," "retain liquid condition," while others looked and wrote as if they knew these business terms.

*General comment.*—This lecturer is undoubtedly one of the best that one is likely to hear on a university campus. Nevertheless, there was little evidence that he understood that teaching should result in an interplay of mind on mind; that a class hour should be for the student an active hour; that the instructor should contribute something—the fruit of his scholarship and experience—which the students cannot obtain for themselves by their own reading.

LECTURE NO. 2

*Course.*—Abnormal psychology.

*Grade.*—Mixed group of Sophomore, upperclassmen, and graduate students.

*Size of class.*—At least 400; probably 450–500.

*Subject.*—Paranoia.

*Content.*—The four phases of paranoia:

1. *Grandeur:* Rich auditory imagery; paranoiac often fails to distinguish between reality and imagination; general elation and high self-esteem Illustrations. "The nauseating social-religious reformers" often belong in this group.
2. *Delusions of persecution:* A natural outgrowth of phase 1; others do not share the esteem in which the patient holds himself; he rationalizes this failure in terms of persecution; often takes on characteristics of famous people—e.g., the Napoleons, Christs (grow beards and change clothing), inventors, etc.
3. *Retrospective phase:* Patient goes back to earlier years and discovers in the "grandeurs," the early signs of this present greatness.
4. *Deterioration:* The stage described. "The purpose in giving you these steps is to help you recognize these types." Litigious paranoiacs discussed; these patients persist in litigation, they fight for their rights and confuse the fight for their rights with being right. They are very clever in debate.

"We are all a little paranoiac; we get into erotic states and behave like the paranoiac who writes letters of admiration to men in public life, refuses to accept rebuffs, and interprets failure to be answered in the same way as you do when you persist in winning the affection of the one you love."

After persistent efforts come the threatening letter, and the obtrusive stage is entered. "I expect an array of Hitlers to take the place of the Napoleons." Continued refinement of obtrusive stage.

"See how difficult it is to set limits of paranoia and set it off from other forms of mental behavior. . . ." "In the interests of normality we ought to be trained in our inadequacies of knowledge and realize how easy it is to become superior."

". . . Take the people who make many self-references that are not justified—look out—this is the sign of paranoia." When there is a constant blaming of factors in the environment for one's own failure, "then we are dealing with paranoia. When you see an individual who suffers easy and deep injury to pride, you will find incipient paranoia." It is through these paranoiac manifestations that the patient gets to his justifications and rationalizations.

Seventy per cent of paranoiac patients are males, fifty years old or older. In dealing with paranoiacs, we are dealing with people who have "to protect their vulnerabilities." Many of these patients have been homosexuals, and this condition intensified their feeling of being spied upon.

The paranoiac states: delusional systems may be well developed and yet deterioration may not have set in. These states occur most often in people who have spent long periods of illness and in women who do not trust their husbands.

*Method and appraisal.*—1. Straight lecture; well prepared and well read from a manuscript. This material lends itself to easy summary which can be presented in two or three mimeographed sheets. Such a summary, with adequate references, would prepare the student for critical reaction to questions and problems which might be presented.

2. Nothing that occurred was designed to protect the individual student from an unfortunate, amateurish self-analysis and diagnosis of others. Not a single word of warning was given. In fact, paranoiac manifestations were pointed out in what we regard as the behavior of normal people.

3. A student would be justified in assuming that the line of demarcation between normal and abnormal behavior is very tenuous and that we are all paranoiac to some degree. The very concept is wrong and even vicious, for there are (*a*) variations within the normal range of behavior and (*b*) marked differences in frequency, intensity, and persistence toward abnormal behavior in the abnormal person. The difference between normal and abnormal is quantitatively and qualitatively very marked.

4. Even medical schools usually do not teach more about paranoia in one hour to third- or fourth-year students, but they teach the subject with greater care: (*a*) the students are older; (*b*) the students have had some clinical medical education; (*c*) the classes are smaller; (*d*) case histories are presented and sometimes selected patients themselves.

But in this lecture we find none of these safeguards. The lecturer is an effective speaker and a well-informed student of his subject. He would undoubtedly insist that this summary presents evidence that the observer misunderstood him, took him too literally, and read too much into a casual reference. The observer undoubtedly did. But so did hundreds of students who brought less to the subject than he. The fact remains that both the lecture method and the size of the group thwart even the best efforts to develop correct concepts of normal and abnormal behavior and to correct misconceptions that students bring to class or develop in class.

*Student reactions.*—Interested; very active in note-taking; no genuine student reaction possible because of (*a*) method, (*b*) size of class, and (*c*) the quantity of material covered. Toward end of hour students became tired, stopped writing, and relaxed. The whole hour was rich in the possibilities for destroying peace of mind of young people, even those who took the course for vocational reasons, as a preparation for social work or teaching.

LECTURE NO. 3

*Course.*—History of science.

*Grade.*—Open to any undergraduate, mainly Sophomores.

*Size of class.*—About 175.

*Subject.*—Sixteenth-century medicine and natural science. (Special note: This is a relatively new element in the curriculum and is designed to give the students an insight into the development of science and the scientific method.)

*Content.*—The following outline was placed on the board before the class assembled:

16TH-CENTURY MEDICINE AND NATURAL SCIENCE

I. Medical profession
II. Medical studies
  A. Anatomy
  B. Surgery
  C. Contagion
III. Natural history
  A. Animals
  B. Plants
  C. Magnetism
  D. Chemistry

The instructor began with "Who were the professional people of the time?" The status of the physician described. The surgeon was not a university man; auxiliary surgical services by barber and veterinarian. The University of Padua and its intellectual freedom arising from the fact that it was the center of learning of the city of Venice. Scientific interests of physicians of sixteenth century (see outline under II and III); these described.

Vesalius and his contribution to anatomy; his dates, family origin, and education. A humanist who switched to medicine. Later, professor of medicine at Padua and there made revolutionary changes in his own teaching by actually doing the dissections under observation by class. He illustrated his book on anatomy by excellent plates, in which he tried to show the anatomy of the living, the organism in action, rather than the anatomy of the cadaver. In 1543 (year when Copernicus published) Vesalius published his book on anatomy. He went to Basle to supervise the publication. He based his work on his own dissections and swept away many of the misconceptions of Gaeleus. He made a good study of the anatomy of the heart and denied the contention of Gaeleus that the wall between the chambers allows spirits of one to flow to other through tiny openings. Described results of vivisection and made generalizations about the physiology of muscles. When Vesalius returned to Padua, he found resentment at his radical changes. Left to become court physician at Madrid. Made pilgrimage to Jerusalem, to escape unpleasant court duties, and died on his return voyage.

"Next I want to turn to the subject of surgery." I'll talk about Paré. He started as a barber and became a leading army surgeon. He denied that gunshot wounds were poisonous and that they had to be treated with boiling oil. Fortuitous discovery, due to shortage of oil. Introduced system of tying off blood vessels instead of burning them off to control bleeding. Also made contributions to obstetrics. A humble man.

"Another medical man I want to mention is Fracastoro," especially in relation to contagion. Biographical details, family origin, where educated, and names of some of his contemporaries. Wrote two books: first in 1530, *Syphilis: The French Disease*, a long Latin poem which gives mythological origin; second, in 1546, on contagion, gives three forms of transfer of a disease. Copernicus was his fellow-student and like Copernicus, he was interested in astronomy and wrote on the inadequacies of old or existing astronomical systems but made no suggestion of new system of his own formulation. He made contributions to geology, to the understanding of fossils, and to mapmaking.

"In the study of animals I might mention von Gessner." Biographical details. Wrote the history of animals, an encyclopedia of zoölogy. He was critical and knew some of the animals through direct observation, but he had "poorer understanding than Aristotle." He introduced copious illustrations of animals. Belou, a French physician, also introduced illustrations of animals and showed the skeletons of birds and of humans, thus trying to show homology of structure.

In the field of botany, medical men again were active. They began by listing plants of medicinal value. Fuchs is an important figure here. He developed a set of precise names to facilitate the understanding of descriptions of plants. The Italian physician, Cesalpino, began to treat botany as an independent science, "classifying plants in terms of flower-bearing." This is significant.

"I want to mention the contribution of Queen Elizabeth's physician, Gilbert," who wrote a book on magnetism. He made extensive experiments in magnetism, and he distinguished magnetic from electric (static) attraction. He also predicted the action of the compass needle, which later navigators verified.

*Method.*—Slow, deliberate, and careful lecturing, with emphasis on history as chronicle, not on history or on science, as the title "History of Science" indicates. At no time was the method of history or of science stressed or the significance of the content indicated. Fact followed fact in severely chronological order, making a succession of static facts. At no time was there a point of contact with our thinking, our scientific methodology, or problems in science.

What ideas were aroused in the minds of the students by such expressions as: classification in botany according to flowering; he made a significant contribution but "he had a poorer understanding than Aristotle"?

*Class reaction.*—A group that was indifferent to the subject of the lecture. The students read and wrote letters, conversed, and occasionally took notes. There was general promotion of boy-girl activities after first 15 or 20 minutes.

LECTURE NO. 4

*Course.*—American political thought.

*Grade.*—Sophomore standing.

*Size of class.*—160–90.

*Subject.*—Two parts:

A. A summary of suggestions for the improvement of the course, made by the students
   1. Most students said, in various ways, "excessive readings."
   2. Some said more discussion; others, less discussion.
   3. The most significant criticism—"a concept course . . . more concerned with movements than with men, would be better"—was dismissed by the instructor for the amazing reason that it was made by only one student.
   4. Lecturer is biased, "admitting a bias, does not make one unbiased." This again was made by a single student. The instructor admitted his "bias" and expressed the belief that, by stating his position and teaching from it, he would be more stimulating.
   5. Lectures do not parallel the text; others said lectures parallel the text. Two sides equally balanced statistically. The point dismissed.

B. Contribution of American political thinkers to American political thought
   1. Recent thought on social-contract theory. By 1850 people began to doubt the theory; they rejected the implication that the sole source of authority is the will of the people. Further, the contract theory implies that successive generations are bound by a contract made by the original generation. Francis Lieber and John W. Burgess.
   2. Natural law and natural rights. Natural rights are very difficult to define except in terms so general as to convey no precise meaning. (No examples.) Rights are derived from government. Return to Lieber and his defense of natural rights, i.e., the rights that flow from the mere existence as a human being. No one knows where to set the limit of natural rights. Rights arise in the process of creating a state. (No illustrations.) Burgess believed that there are no rights except those derived from the state. Giddings cited.
   3. The end of the state. Various philosophies cited which stressed the concept of the "end of the state" and which evaluated such ideas as rights, liberty, social control, etc. Reverted to Lieber's threefold idea concerning end of the state. Woodrow Wilson and three or four others cited.

*Method.*—Lecture unpunctuated by a single question either by the instructor or by the students. The subject matter of the talk lends itself easily to summary on two or three mimeographed sheets.

*Student reaction.*—Passive, quiet, busy taking notes, but intellectually inactive and submissive. Not a single interruption occurred to question an idea or its implication, to express a difference, or to add another reason for agreeing.

*Appraisal.*—The instructor is young, inexperienced, and fluent. He gave a good talk by orthodox standards, but he failed to interpret the easy generalizations in terms of students' experience. When he gave an illustration, it was bookish and did not clinch the point. The primary purpose seemed to be "to cover the three subjects," hence he flitted from idea to idea but reduced none to its basic elements and its primary implications.

The criticisms of the course by the students indicate that there are keen minds who could carry a Socratic type of teaching with profit to themselves and their classmates. There was little more than mere verbalism; there was translation of the speaker's speech sounds into written symbols. Most of the instructor's contribution remained symbols. What is meant by "end of state"? The termination of existence or its ultimate purpose? What does the expression "end of state" connote to the students? How would the instructor know?

RECITATION AND DISCUSSION NO. 1

*Course.*—Social science, second unit.

*Grade.*—Freshmen.

*Size of class.*—24.

*Subject.*—Freud on "Civilization and Its Discontents."

*Content.*—Instructor began with "Any questions?" He assumed that the class had read the text and that each member of it had identified his difficulties.The first question was "What is meant by 'there is a conflict between the ego and the object for the libido'?"

The instructor expressed the opinion that this is the most difficult sentence in the text and proceeded to clarify it by asking questions which broke the major concept into constituent ideas. The subject matter was beyond the grasp of the students; they tried to answer,

to follow the instructor but could not reduce the generalization to concrete experiences.

This led to a discussion of Freud's belief that there is an inner erotic impulse in culture that makes for greater unity. But this again was beyond their grasp. The instructor then repeated a former explanation that Freud's attitude is biogenetic essentially, and he applied it to religion, art, the state, etc. To Freud the tensions of human life have their origin in youth, in the frustrations, failures, fears, successes, etc., of youth. The instructor did well, but the students seemed too young to bring anything to the ideas expounded; hence they did not understand them. Result: they were left with words. The discussion ran off to art and sex and Freudian attitudes toward both.

*Method.*—An alternation of lecturing and Socratic questioning. The instructor is an alert young man, well prepared on the whole, but he came to class to answer questions that students would bring rather than to present questions of his own, designed to guide student thought and to dispel students' misconceptions. Sensitive to their difficulties, he digressed and did not return to the first question asked him until the end of the hour. His answer was good, but for most of the class it did not rise above the level of impressive language.

*Student reaction.*—Interested and struggled for clarification, but few participated in the discussion.

*Appraisal.*—(1) The students should have been given a half-dozen questions to guide them in their critical reading. (2) Prepared answers would have had more substance than the spontaneous answers to questions that run deep into individual and social motivations. (3) Illustrations and references were either general or hypothetical; hence they did not help the students in their quest for understanding. (4) The ideas of ego, object, libido, eros, etc., were not clear enough to the students to be used by them in their thinking. (5) There was something genuine about the hour, even if it seemed futile and touched very few of the group.

RECITATION AND DISCUSSION NO. 2

*Course.*—The history of education.

*Grade.*—Graduate students, some close to the Ph.D.

*Size of class.*—14.

*Subject.*—"Continuation of Scholasticism; Jesuit Education."

*Content.*—A student unexpectedly opened the hour with this question: "Why does a culture or a people decline or die out?" The instructor turned the question over to the class with no preparatory guide or comment —just with "What do you think?" The class gave every conceivable answer: excessive imitation of the past, repression of the masses, society grows selfish, dimmed imagination, excessive ideology in support of the status quo, too few utopians and nonconformists, the equities which the powerful have in the old system are too strong to accept social change, etc.

After 25 minutes of this unorganized discussion, the instructor began to put a few ideas together but permitted himself to accept further stray contributions by the class. After 37 minutes of this kind of disorganized discussion, the instructor offered the following: "I have no answer for you, but I would not accept any one answer." By this time the class gave indications that its members did not know to what specific question he had no answer.

Instructor then opened the assigned subject with "What did you get out of your book and other sources about the Jesuits?" Again the general question led to unorganized answers about the *Ratio studiorum*, its origin in approximately democratic form, its stability, its stress on mental discipline, its religious content, the dialectic, etc. But there was no focus to the discussion, no direction, no incisiveness, no depth.

*Student reaction.*—The students were a mixed group, twenty-five to thirty-five years of age. Their academic careers had been interrupted by years of military service, which had given them a practical outlook on life. Conversations with them revealed an eagerness to get into real problems of teaching and to prepare themselves adequately in the hope of accelerating professional advancement and thus reclaiming some of their lost time.

*Appraisal.*—The instructor's general background of knowledge seemed entirely adequate for the work assigned him, but he had neither *purpose* nor *direction*.

RECITATION AND DISCUSSION NO. 3

*Course.*—Family life (a general orientation course).

*Grade.*—Freshmen.

*Size of class.*—30.

*Subject.*—Divorce.

*Content.*—The hour was divided into two parts:

A. Comments on students' notebooks and student criticism of the course.
   1. The comments on the Pearl Buck reading were not consistent, "some think it should be continued, others, that it should not."
   2. "There was divided opinion on whether pregnant women should smoke." A young man spoke up: "What's the reason for believing that pregnant women should or should not smoke?" The reply was that some toxins get through the placenta, but in all cases it is best to follow the advice of one's own doctor.
   3. Students approved a radio program, "Doorway to Life." The instructor recommended this very highly.

At this point the consideration of the students' criticisms began to thin out, and the instructor announced the need of getting to the subject of the hour.

B. *Divorce* (the subject planned for the hour)
   1. Reference to the statistical background given at last session of the class.
   2. Grounds for divorce in the state of X (*Dictated by the teacher, who read it from a text.*)
      *a*) Adultery
      *b*) Impotence (pronounced impō'tens)
      *c*) Cruelty
      *d*) Prison sentence subsequent to marriage
      *e*) Habitual drunkenness
      *f*) Insanity, i.e., after 5 years of commitment
      *g*) Continual separation for more than 5 years
      *h*) Desertion for more than 1 year
      *i*) Summary
         (1) 50 per cent of divorces in X granted for cruelty or desertion
         (2) X not as severe as New York nor as liberal as Nevada in divorce proceedings
   3. Statistics: these given, summary follows
      *a*) Divorce is most common after early marriage or quick marriage
      *b*) Divorce is least common in families that have children
      *c*) Divorce rate is high
         (1) For city-born
         (2) For those who come from broken homes
         (3) During first three years of marriage

Nothing was said to stress social and personal significance of these facts.

   4. Causes of divorce (given freely by students):
      *a*) "Increased complexity of living." This was repeated frequently but never with a single instance
      *b*) Increased ease of getting divorce; social attitude is lenient
      *c*) Women's rights (no illustration)
      *d*) Too short courtship
      *e*) Poor living conditions—the housing problem
      *f*) Glamorization of divorce—the Hollywood influence, i.e., favorite movie stars get divorces
      *g*) Inadequate preparation for marriage. Repeated again and again, but no indication of wherein the inadequacy lies or what to do to make preparation adequate

Theme died out in disorganized class discussion. Nothing done to show that classification above does not classify, that *a*, *c*, and *g* may say the same thing or not; that the Hollywood influence may work in opposite directions, for many of the stars live lives that exemplify fidelity and sanctity of marriage. No mention of influence of religion.

   5. Improvement (of what? not indicated):
      *a*) Make divorce harder to get and insist on trial separation
   6. Return to "Causes," topic 4
      *h*) Emotional immaturity (no illustration; no explanation)
      *i*) Unhappy home life
      *j*) Personality differences

*Question by student:* "What's the harm in divorce? I see none, if there are no children to consider and the two people concerned are willing."

*Answer by teacher:* "I see nothing wrong under the circumstances; of course, some people do and we must keep that in mind."

   7. Return to "Improvement," topic 5, above
      *b*) Better home life (better in what respect?)
      *c*) Specialized training in psychology and psychiatry for lawyers, and ministers who advise couples in difficulty
      *d*) Limit "Hollywood influence" and "soap operas." How? In what respect? (Not even suggested.)

*e*) Psychiatric counseling before divorce proceedings

*f*) Education about marriage at high-school level

*Teacher.*—"We have enough points." A student was eager to add: "Psychologists and psychiatrists get divorces as often as others." Teachers comment: "That is unfortunately true, but they are people too."

*Method and appraisal.*—Informal procedure, a combination of lecture and unstimulated and undirected contributions by the class. There was no sequential thinking, no critical attitude toward anything, no careful analysis of a single important idea.

Expressions and terms like the following (here italicized) were passed from person to person and then put on the board but were never questioned: (*a*) *new psychological aids:* what ones? not one was named or identified; (*b*) *psychoanalytic treatment:* for whom? for what? what is it? who should decide when it is necessary or advisable? (*c*) *emotional immaturity:* not a single illustration given; (*d*) *life is more complex*—in what way? in all ways? and (*e*) *training for marriage:* specifically what is to be done?

The hour lacked the vitality, the challenge, the thinking, that should characterize a guided attack on a social problem.

Nothing happened to diminish the flabbiness of thought and looseness of language; nothing to help young people go from idea to idea to a conclusion; nothing to engender disrespect for loose thought or respect for sincere search for a well-supported design of thinking and intellectual living.

RECITATION AND DISCUSSION NO. 4

*Course.*—Geography of the Far East.

*Grade.*—Upperclass and graduate students.

*Size of class.*—14.

*Subject.*—Aspects of industrial activity in Japan; industrial crops.

*Content.*—The emphasis on regions in a large country like China versus lack of such emphasis in a small country like Japan. Areas to be considered—primarily middle or transitional area and northern area; reasons for this. Differences in types of agriculture; significance of certain crops; the importation of industrial crops like cotton, wool, etc., but not silk, the only nonimported industrial crop of Japan. The decrease of the mulberry crop by almost 75 per cent since the early 1930's to 1946. The present plan is to increase the present crop by 25 per cent and stabilize it at 50 per cent of its former peak; reasons—the synthetic products, the disruptive effects of the war. Implications of this for Japan, for the United States.

*Method.*—An informal procedure in which the instructor elicited the significant implications of the facts and the causal relations among them. He indicated clearly what parts of the subject the students are to acquire for themselves—communication, fishing, industry, etc., while he would make himself responsible for material of at least equal importance but which is still in unavailable government reports. His questions stimulated thinking—making and justifying inferences, tracing effects back to causes, following causes to their effects. The instructor read from government reports still in typed form and supplemented from his personal experience what the students gathered from their readings. There was a clearly discerned purpose that gave direction to the hour and shaped the instructor's teaching procedures.

RECITATION AND DISCUSSION NO. 5

*Course.*—Natural Science 1A.

*Grade.*—College Freshmen and Grades XI and XII.

*Size of class.*—25.

*Subject.*—Galileo on Aristotle's study of laws of moving bodies.

*Content and method.*—The following outline was developed by questioning the students, who had read *The Two Sciences of Galileo* (p. 59 and following text):

| 2 Weights<br>1 Medium | 2 Media<br>1 Weight |
|---|---|
| Velocity $\propto$ weight | 1. Vel. $\propto 1/d$ ($d$=density)<br>2. $d$ of vacuum = 0<br>3. Velocity of vacuum = Infinity<br>4. $\therefore$ Motion is instantaneous<br>5. This is impossible<br>6. $\therefore$ Can't have motion in vacuum<br>7. $\therefore$ Vacuum is impossible |

This represents what Simplicio says Aristotle believed. Most of the hour was given to identifying the fallacies, e.g., (4) motion takes place in time, hence is not instantaneous; (5) is not proved as a result of 3 and

4; (6) is not true in the light of experience and experiment; (7) is what Galileo did not want to prove and did not accept.

*Student reaction.*—Keen, spirited, vigorous. The hour may have been meager in facts concerning the physics of our day, but it was rich in applications of logic. To help the students get at the fallacies in Nos. 4, 5, 6, and 7, the instructor asked what steps one may take when he disagrees with a conclusion. He elicited the following steps in:

| Reaching a Conclusion | Challenging a Conclusion |
|---|---|
| 1. Statement of axioms or postulates | 1. Examine the assumptions which may be contradictory |
| 2. By logic, statement of a proposition or judgment | 2. Trace errors in the flow of logic |
| 3. The conclusion formulated | 3. See whether the conclusion is inconclusive, a *non sequitur*, etc. |

*The instructor.*—A gifted teacher who can frame incisive questions; he has a contagious aggressiveness in the pursuit of an idea.

*Appraisal.*—One may question the value of the specific subject matter and even the objective, but the hour gave students training in (*a*) sequential thinking, (*b*) precision in the use of words, and (*c*) selective and critical reading—the essence of the art of study.

RECITATION AND DISCUSSION NO. 6

*Course.*—Humanities, third semester.

*Grade.*—Sophomores.

*Size of class.*—15.

*Subject.*—The influence of Cervantes.

*Content.*—The instructor began with the question "What is the primary significance of Don Quixote?" The students who volunteered or who were called upon expressed doubt about the social importance and literary quality of the book. The instructor and five or six students sought to dispel these doubts, but it was clear they were not successful; only two students modified their positions: one said that he felt "sorry for Don Quixote because of his assault on a hopeless situation"; the other, more moved, "took pity on Don Quixote." In the discussion thus far, there was no mature observation on the social and literary significance of the book or of Cervantes. Time elapsed: 20 minutes.

The instructor sought to rescue the discussion and asked: "Is the value of the fictional character, Don Quixote, as an end in itself, fully justified?" There were six or eight "Yes" and "No" answers and a little inconclusive talk. Time elapsed: 10 minutes.

At this point, a student introduced a digression which took care of most of the remaining part of the period. He observed: "Don Quixote is not a sane character, and the portrayal as such may be a justifiable end in itself." Some students attempted to develop the idea in one direction or another. The instructor observed that it "seems difficult" to keep sane "even these days" and referred to "statistics," without identifying the source, that reveal a marked increase in the number of mentally sick. The reasons for "this condition" were offered by the class, and a student finally closed this part of the discussion by explaining that present-day methods of diagnosing mental illness are far superior to the old—hence we detect and identify more cases today—but that the "distribution of the mentally ill in the population is about the same." This contribution appeared satisfactory in substance and language to both the class and the instructor because no modifications were suggested. But neither students nor professor could quite let go of the subject of mental illness; in quick, short observations, the discussion ran off to psychoanalysis, the shift of responsibility for personal conduct from self to the analyst, the promise and the weakness of psychoanalytic techniques, and, finally, to God, faith, and psychiatry. The observer cannot tell how these contributions became part of the discussion. His notes reveal that Freud was given 12 minutes which rightfully belonged to Cervantes.

The group was brought back to Cervantes with this question: "Who takes the initiative in all these adventures?" The instructor explained that in a life given to fantasy, like Don Quixote's, "the subject takes the initiative, confident that adventure will overtake him." Whether the class identified the noun "subject" correctly or derived any helpful idea from the expression, "adventure will overtake him," the observer cannot say, nor has the instructor any basis for appraising the effect of these words on the class. The hour came to a close with this question: "What do you make of the story of X [an episode in *Don Quixote*]?" Without waiting for an answer, he quickly followed it with: "What is the story intended to do?" "What does it mean?" The accepted answer was: "Don't push your luck too much." As the bell rang, the instructor asked

hurriedly: "Is this an original story?" Under the pressure of the circumstance, he answered his own queries: "I don't know; it is probably an old folk tale."

*Appraisal.*—The instructor is a young man with an engaging personality and an alert mind, who can be helped to a more effective performance. His inexperience is as obvious as the failure of his chairman to give him simple, but essential, guidance before sending him to class. The result is obvious: desultory, unorganized observations, whose weaknesses derive in the main from the complete absence of objective. What was the instructor trying to achieve? He had no conception of what a teacher or a student should do to prepare for a class discussion. He brought to class two or three questions and a fervent hope that the students would fill the allocated time and give direction to the discussion. Evidently the instructor, too, was "pushing his luck too far."

RECITATION AND DISCUSSION NO. 7

*Course.*—Contemporary civilization, second semester.

*Grade.*—Freshmen.

*Size of class*—25 and about 5 student visitors.

*Subject.*—John Stuart Mill on government.

*Content.*—By skilful questioning the instructor elicited the essential facts in the economic, religious, and general cultural life of England in 1861. This became the background for Mill's beliefs.

Again, by incisive questions, the class was led to summarize the major ideas of Mill's political theory.

The heart of the hour was focused on the rights and protections of the minorities and of the majority. The blackboard summary, evolved, step by step, from the students' answers, finally took this form:

| Majority vs. Minority | Minority vs. Majority |
|---|---|
| Majority protected by | Minority protected by |
| 1. Education of people | 1. Same |
| 2. Proportional representation | 2. Same |
| 3. Independence of judiciary | 3. Same |
| 4. Freedom of assembly | 4. Same |
| 5. Freedom of press | 5. Same |
| 6. Freedom of association | 6. Same |

*Conclusion.*—The same forces protect both the minority and the majority.

Throughout the hour a great variety of vital ideas were raised: freedom and its limits; the limit of disagreement; When does self-protection justify the state in employing restrictive or coercive measures? Shall we apply different standards of freedom to different levels of culture? etc.

*Appraisal.*—Here is an unusually effective instructor in the social sciences who is not only well informed but alert and stimulated by a contagious enthusiasm for his subject. He knows his students and their capabilities. By distributing his questions to students according to their varying abilities, he brings them all into the discussion, often pairing them admirably. He will easily take his place among the most valued teachers in any faculty.

It would, however, be instructive to obtain his answers to such questions as these: Do you think you set off too many ideas and thus create a skyrocket effect in which each idea is too short-lived? Are major ideas and their implications followed up adequately? There are many intellectual flashes, but is the light of any of them sustained long enough? Do you permit your students to live long enough with an idea of major importance? Other questions can be asked in the interests of perfection, but the fact remains that young people leave the class of this instructor intellectually stronger and more eager to meet the challenge of ideas.

Recitations Nos. 1, 4, 5, and 7 are clearly illustrative of a superior type of teaching in which the discipline inherent in a subject is respected and is stressed more than those details of subject matter which are usually presented helpfully in an assigned text. They give evidence of a promising preoccupation with the techniques of teaching.

IMPROVEMENT OF INSTRUCTION

Despite the anonymity with which the observer sought to clothe these reports of actual teaching, college people—students and faculty alike—who have read them promptly attached names to several of them. The lower the level of teaching, the more certain are they that they are identifying the teachers. Invariably they failed, but the readiness and the sureness with which they offered identification must be a source of deep concern to all of us. It is obvious that many faculties of liberal arts as well as of professional schools are alive to the acute need of improvement in instruction. They have been made sensitive to this need by a variety of considerations.

1. Increased enrolments are overtaxing facilities and

staff; more people are to be taught, and fewer fully qualified and experienced people are available.

2. If, because of increasing cost of instruction and prohibitive building costs, there is no escape from large classes and large lecture groups, then the quality of instruction must be improved, and new techniques must be devised for dealing effectively with large numbers at a time.

3. The rapid development of programs of general education requires courses different in content and purpose from the traditional courses that constitute orthodox curricula. But college teachers who have been brought up on orthodox curricula, consisting exclusively of discrete courses in special fields of knowledge, are unprepared, even if willing, to teach these programs of general education.

Further, the concept of the junior or community college, sponsored by the President's Commission on Higher Education and by the New York State Temporary Commission on the Need for a State University, calls for significant improvement in teaching techniques. The curricula of these two-year colleges will, of necessity, lean heavily on general education, and experience indicates that the most important retarding factor in the development of effective programs of general education is the lack of adequately prepared personnel.

4. Increased enrolments have brought into college classrooms an unprecedented number of teaching assistants—young men and women who divide their time and energies between postgraduate studies and undergraduate teaching. One university schedule reveals 50 recitation and discussion sections in the first half of the introductory course in economics. This is not an unusual situation. We find it in other subjects and in other institutions. Who is to initiate these young people into the techniques of college teaching? The harassed chairman of the department? A senior associate who is almost as busy? And what assurance have we that departmental chairmen are good teachers who can guide the novice, by precept and example, to effective teaching.

5. We cannot look to the universities to meet the need for young scholars who are better prepared to teach. For one thing, only a few universities are just beginning to consider the problem of teacher preparation; for another, none has yet formulated a decisive and promising step toward that objective. The requirements for the doctorate have not yet been changed in general design. The university graduate who is awarded his doctorate is recommended for college teaching on his promise as a scholar. As a rule, no one observed his teaching, even if he taught in the very university that recommended him. The recommendations for teaching are nevertheless made with considerable positiveness and enthusiasm. Clearly, the basis of the recommendation still is that he who knows can teach—a belief that persists despite the fact that experience repeatedly reveals its fallacy.

6. Because of the emphasis on research in postgraduate preparation for teaching, the young doctor of philosophy or science often evinces impatience with the many and varied duties that are associated with teaching. There is a reluctance to give the time and the concern that undergraduate teaching demands because that time and that concern, so invested, would be taken from further research. And the number of publications is unfortunately very often the deciding factor in promotion of young people to one of the professorial ranks. Much of this "research" is often a form of busy work because many of these "research" workers have no call for genuine research. For many college teachers, the doctoral dissertation becomes the terminal and only purposeful research and scholarly writing. For the sake of the record, this may be followed by halfhearted, impotent burrowing and collecting of footnotes and hectic effort to find a hospitable professional journal. Not infrequently, aspects of the doctoral dissertation are used for further research, each "blown up" like the enlarged rendition of an ornamental or structural detail of an architect's plan. College teachers whose professional advancement is determined not by the quality of their teaching or by their influence on their students but rather by publications become, with tragic frequency, the melancholy pedagogues who find themselves on a dead-end road rather than in a profession.

But the real scholar, driven by the urge of productive scholarship, does research that is real and usually imparts the zest of creative professional life to the student. Professional promotion should be posited on special competence either as a teacher or as a contributing scholar. To expect adequate and mellow scholarship of all teachers is reasonable and essential. To expect crea-

tive scholarship of all teachers leads to a confusion of values and creates frustration in a college staff.

We return now to any one of the ineffective teaching situations that we presented earlier in our discussion. Let us consider the most stubborn and therefore the most difficult set of circumstances under which a teacher must do his work. Because of large enrolments, limitations of space and budget, and lack of adequately trained personnel, it seems, both to administration and to faculty, that the only way to meet the situation is to offer a given study to large lecture groups of 750 or 900 each. We shall assume that the lecturer has a teaching sense and is not willing to present to his students, hour after hour, for ninety hours, what they, as literate people, ought to bring to him. What is his way out?

First, limit the didactic or telling type of lecture to those situations or that subject matter that cannot be presented in any other way. The didactic lecture would be designed to

*a*) Present a helpful organization of a large segment of subject matter so that students may have a structural frame of reference

*b*) Develop points of view, standards, or sets of values that differ from those in the prescribed texts or reference readings

*c*) Present subject matter not available in print or that is the product of the instructor's own studies and research

*d*) Survey the bibliography to be used in the course and make appraisals of important bibliographical references

*e*) Undermine common misconceptions revealed in students' papers or present essential elements in the methodology of his subject to guide students in their study and in the preparation of term papers

Second, if the necessary texts are unavailable in sufficient quantities for the large numbers of students, suitable summaries of the material should be prepared in mimeographed form for critical study by the students, so that they may bring as much of a background of information to each lecture as circumstances permit.

Third, at the beginning of each lecture there should be distributed a carefully devised set of applications of the subject matter that the students acquired either from books or from the summaries to which we referred. These applications should be designed to test comprehension of the material, its deeper implications, and the students' ability to use this information to a purpose. The sheet of applications for Lecture No. 1 (outlined above) might include the following:

*a*) *Questions.*—What are the steps in discounting a note? In rediscounting a note? Under what circumstances are notes rediscounted? How many agents are involved in discounting a note? In rediscounting it? How does each agent profit in rediscounting a note?

*b*) *A problem.*—Here is, in abbreviated form, a summary balance sheet prepared by a local bank in a midwestern city of 60,000. Does this bank carry the necessary legal reserve? An adequate reserve for the general run of business?

*c*) *Application to current problems.*—"The removal of controls sets the forces of free enterprise operating and, by releasing hoarded goods, relieves critical shortages" (from an editorial). Discuss.

"The better business conditions are for the employer, the better they are generally for the employees. Workers never thrive when business is bad for the boss" (from a talk by a labor leader at a union meeting). Discuss.

When 600 or 900 students are taught at once, a minimum of mechanical equipment is essential. We assume, of course, a very large board for writing, adequate lighting on the table for demonstrations, a good public address system, and a half-dozen portable microphones. Given this equipment and a few student assistants, what can the lecturer do? In addressing himself to the "Problem," he asks the students to consider with him the appoach to the question: What facts are revealed in the statement? Are additional facts necessary to answer the question? If so, how can they be obtained? by reference to the law? To the manual of procedures of the Federal Reserve Bank? What principles of procedure need we recall to supplement the facts? Combining facts and principles, what is the answer to the first question? To the second? What aids are available for verifying or checking these answers?

Let us turn to the first part of question *c* which calls for a discussion: Here the instructor asks: What must be done before one begins to write or talk? What is meant by "think"—a fervent, perhaps impotent, expectation? If "to think" means to ask one's self questions, then one must devise suitable questions: What is the specific issue which the citation raises? What facts are necessary before one can begin such a discus-

sion? In what order shall these facts be arranged? Which of the accepted principles of economics and business practices may be helpful? What conclusion do you reach from facts and principles? How does this conclusion stand up in the light of experience? In the light of all that is fundamental, so far, in this course?

If the lecturer is supplied with a helpful chart of the seating arrangement, he can call, occasionally, on an individual student to whom a portable microphone is brought by a student assistant. Frequent use of a well-illuminated blackboard fixes the steps of progress toward a conclusion and diminishes the need for hectic note-taking.

What may be said for this type of procedure?

1. Generally speaking, a lecture does not achieve the effectiveness of an instructional technique unless it is interrogative as well as declarative and didactic. (There are exceptions, as cited above.)

2. Students learn the mode of thinking characteristic of a subject by following repeated demonstrations of it.

3. The lecturer has an opportunity to reveal himself —the mellowness of his scholarship and his facility in applying it to life-situations. Consider the significant loss when 750 students listen to an instructor of keen mind and sound scholarship, three times a week for thirty weeks only to hear him say what is available in print, sometimes even in his own book. After ninety meetings with this scholar, they have not really met the mind of the man. But in the type of application-lecture proposed, the scholar cannot avoid revealing himself and the discipline inherent in the subject that he teaches. Each such lecture is a training in careful thinking and in the importance of suspending judgments until they are verified. Each such lecture gives students ample motivation for an honest preparation of assignments and for sustained attention to every turn in the discussion. A successful teacher is essentially interrogative- rather than declarative-minded.

### WHAT IS PROPOSED

The visits to lecture halls, classrooms, and laboratories disclose impelling reasons for (*a*) better preparation of graduate students for the serious business of teaching young students of college grade and (*b*) the definite necessity of undertaking an in-service program designed to improve the quality of instruction. Let us address ourselves to each in turn.

A. It is proposed that graduate schools, which are the source of the supply of college teachers, recognize the importance of the techniques of effective teaching; further, that they agree to appraise the students whom they recommend for teaching in at least three respects.

First, an appraisal of scholarship. The meaning and the nature of scholarship must, of course, be left entirely in the hands of the faculty and its organic divisions. They must decide the nature and the degree of specialization, the character of the research and of the doctoral dissertation. Whatever may be the contending conceptions of the standards and practices of graduate schools, we must recognize that the fundamental responsibility for postgraduate education is resident in the faculty of the graduate school.

Second, an appraisal of the breadth of interests and knowledge of the doctoral candidates. A prospective college teacher of history should have a working basis of economics, political science, and cultural anthropology. A prospective college teacher of English should be able to relate the literature that he teaches to the other arts. Without such breadth of related aesthetic interests, he is in danger of seeing literature as a complex of linguistics.

Within the scope of interest we must include an understanding of the contribution which one's field of specialization makes to the total curriculum. A properly oriented teacher of college chemistry thinks of chemistry not as the curricular element designed solely to make more and better chemists but rather as a means of educating young people, of giving them an understanding of scientific method and of the nature of the physical world. Careful but informal questioning of students who have completed satisfactorily six or seven courses in chemistry or physics reveals that, to them, scientific method usually means no more than accuracy in measurement and in recording. Students who have completed eight undergraduate courses in history or in a social science do not necessarily have, as a result of their studies, an understanding of the method of their field of concentration. Further questioning usually fails to elicit intelligent answers to such questions as "What is evidence in history or in sociology?" or "On what evidence does this author characterize the life or the achievements of peoples or of centuries?" Many teachers who are intent on conveying another segment of their respective subjects do not realize, that the

sum of the segments is decidedly less than their specialty and still less is that sum a contribution to effective education.

Such an appraisal of breadth of outlook of prospective college teachers should not be based on course requirements. It must be made by pooling the judgments of those who meet the graduate students in conferences, which, sad to relate, are entirely too few. Personal contacts are important. For instance, an occasional dinner meeting with a graduate student, followed by an hour of discussion, will give a faculty committee valuable supplementary impressions of him.

Third, an appraisal of a candidate's effectiveness as a teacher. It is not uncommon for a great university to recommend one of its graduates to college deans as "a strong addition to your staff" without having any record of his ability as a teacher. Often the person recommended has actually taught in the college of that university, but no one has ever visited him. Unless the undergraduates register persistent complaints about him, the easy assumption is that he is a competent teacher. Here is added evidence of the confusion of highly specialized scholarly attainment with teaching ability.

The individual members of a small committee of the graduate faculty should be required to visit the novice teacher; they should expect him to visit the classes of experienced colleagues and should hold conferences with him after his observations and his teaching. A university in an urban area is suggested to insure adequate opportunity for apprentice teaching because nearby colleges may well be brought into the helpful circle of co-operating institutions.

The plan as outlined is usually well received by members of university faculties, but, unless the initiative is stimulated, it will not be taken. Here and there a department in a university has taken the first step, but it is almost alone in a large institution. It is surprising to hear university professors ask for an enumeration of the elements in terms of which they are to make their appraisals of a novice's teaching. There seems to be implied in this request a belief that a good teacher comes to class with a bag of teaching tricks. The plan must be carefully prepared and more carefully broached to the key people of a selected university. The design of the plan must be kept simple, as indeed it is, and it must not include formal "course requirements in education." Further, it must be centered in any program of graduate studies looking toward teaching and not be made the sole or primary responsibility of schools of education. The initiative, from present indications, is not likely to be taken within the university, and no individual outside it can be effective unless he represents an important educational agency that has no ax in need of a new edge.

B. A very promising in-service plan for sustained improvement of instruction requires all the instructors of each basic general course, usually 12 to 16 people, to meet in weekly seminars to consider such questions as these: What, in the material to be taught the following week, should be stressed? How far shall we carry each major line of thought? Are we agreed, as a group, on the meaning and the implications of the basic concepts? What are the effective modes of approach to each? What difficulties are usually encountered by students of average ability? What are the keenest minds likely to ask? Are we prepared to answer their questions? How far shall we carry the discussion without running the danger of losing the active interest of the class? These questions are not answered by the chairman of the group. He is only one of the participants. They are considered by all, and marked differences of opinion may develop. Sometimes the group moves to a consensus; at other times each member of it is left with his own judgment but with a background of differing judgments against which to reconsider his own. No instructor comes to class unprepared or with a vague idea of what he is to do, hoping that the class or its intelligent leaders will give direction to the hour. Such an investment of time and thought brings a rewarding increase in purposeful teaching, effective teaching in which mind plays upon mind. One who is tempted to challenge the content of what is taught or the tendency to formalize "steps in thinking" is nevertheless favorably impressed with the clearly set goals, the systematic procedure, and the genuineness of the thinking that goes on in most of the classes.[1]

A distinct contribution to the improvement of instruction could be made if there were available records and sound films illustrating various types of effective instruction as they were actually achieved. We must

[1] These suggestions with regard to the staff meeting or seminar are drawn from an example of such in-service education as exists in an institution visited by the author.

stress again that, if large classes are here to stay because of increased enrolments, inadequate supply of well-prepared teachers, and budgetary limitations, then it becomes increasingly important to develop techniques of instruction especially designed to arouse vigorous and sustained reaction by students taught in large groups. But whether the groups are large or small, one sees, with discouraging frequency, purposeless teaching, flabby rather than vigorous thinking by students, occasional rather than sustained attention, and student preoccupation with note-taking rather than with the inwardness of the idea presented.

A collection of records and films of most effective types of instruction under various legitimate circumstances could be made available to college teachers. Neither the record nor the sound film need or should run for a full academic hour. A suitable introduction would prepare the listener or the observer. The essentials of the teaching procedure must, of course, be presented adequately and in sequence, but transitional and obvious steps can be telescoped with profit, for not every minute of a class hour need be recorded. Nor is it expected that an entire record of film will exhibit an unbroken series of successful teaching episodes. If it did, it would record what has been staged rather than what has actually been achieved in a real teaching situation.

No commercial house is likely to undertake to make these records and films on its own initiative. The venture is not likely to pay for itself, let alone yield a profit. It would seem that this project might be undertaken by a university or a foundation that has for years been concerned with the quality of teaching and that is prepared to subsidize it. Such a sponsor would naturally have the co-operation of colleges and universities. The professional journals in every field represented in the curriculum would carry the story of the project, as well as the titles of the growing collection of records and sound films of effective teaching. College and university departments might reasonably be expected to take the initiative in requesting the sponsoring agency for the loan of these materials. If these records and films were well conceived and successfully executed, the demand for them would undoubtedly grow, and they would do much to influence the thinking about teaching.

Talks with faculty members on several campuses visited recently by the author revealed eagerness for such guidance. Chairmen and deans expressed conviction that there is genuine need of it. Their concern for improvement in the quality of instruction was repeatedly made manifest.

The postgraduate years, under existing conditions, are crowded with imperative activities related to the mastery of subject matter and the skills of highly specialized areas of knowledge. An attempt to introduce a series of abbreviated courses in education and psychology would be resisted very vigorously by all graduate divisions except schools of education. Visiting fellow-teachers is in itself an effective stimulus to critical appraisal of one's own aims, standards, procedures, and attitudes. Even a visit to an ineffective teacher may be helpful—negatively, to be sure—because it may reveal practices that unfortunately characterize the teaching of the observer as well as the observed.

Visiting one's colleagues, while helpful, is subject to several serious limitations: personal reasons may preclude visiting some colleagues; in a small department the opportunities for intervisiting are naturally few; in a department or division committed to set values and procedures, visiting one's colleagues is likely to yield little that is stimulating. To widen the scope and enlarge the professional values of these visits, one must travel to a number of institutions and be equipped with an understanding of their distinctive programs. Practical considerations make this almost impossible. And yet it is important that college teachers have opportunities to observe distinguished teachers of sister-institutions as readily as they would visit their own colleagues during "off-periods" on their own campus. A collection of records and sound films of the most significant types of instruction under various legitimate circumstances would offer valuable, vicarious experiences; for with them a college teacher concerned with techniques of instruction could visit the classes of the most distinguished teachers without leaving his own campus.

There are today about two and a quarter million fully matriculated college students in the United States. The temporary fall in that number in the next few years is socially insignificant for at least two reasons: most institutions are at present overcrowded; the elementary-school population which has risen and will con-

tinue to rise to an unprecedented peak in about 1954 will, perforce, create swollen enrolments for the colleges by 1960.

A greater obligation than ever before rests upon all institutions of higher education to prepare to serve these young people of proved competence, from whose ranks will be replenished all professional and most subprofessional callings. From the young men and women in the colleges during the next decade will come the leaders in the biological and natural sciences, in the major activities related to social controls, and in the development of the humanities which are so well designed to make "man more man." An immediate responsibility of impressive magnitude, therefore, falls, in our day, upon those who are preparing the teachers of the college of tomorrow.

# *The Nature of Scientific Knowledge as Related to Liberal Education*

JOSEPH J. SCHWAB*

IN A PREVIOUS paper[1] concerning the nature of scientific knowledge and its bearing upon the teaching of science, the author dealt principally with practical aspects of the problem. That paper had two aims. One was to describe a method of group study and group planning adequate to the problem of constructing a course in science in a program of liberal education. The second was to describe the three-year program which emerged from such study and planning.

In these descriptions several theoretical considerations were employed as premises. The principal of these had to do with *diversity* of view concerning the nature and method of science. It was said that there was diversity of view concerning science as a whole, since science could be examined from several points of view, each of which emphasized different factors. It was further said that science was itself heterogeneous with respect to the patterns of inquiry employed, certain patterns characterizing some fields of research, while others dominated in other fields.

The present paper discusses this theoretical point in itself in order to offer some evidence for the existence of this diversity, to give some examples of the diversities, and, in relation to educational practice, to suggest some ways of coping with them in a program of liberal study in science. The first of the paper's four sections attempts to show that the apparent general agreement concerning the nature of science holds for descriptions pitched at a very high level of generality but disintegrates or has little or no validity when the problem of the nature of science is approached in terms of concrete specimens of research in the various fields of science. The second section describes three types or sources of diversity about and in science, diversities of interpretation of the nature of science, and diversities in science itself, which are significant for planning in education. The third section provides a tentative taxonomy of the varieties of scientific knowledge, that is, of the most significant type of diversity *in* science. The fourth section treats some of the educational implications stemming from differences of interpretation of the nature of scientific knowledge and from significant diversities within science itself.

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[1] "The Science Programs in the College of the University of Chicago: The Three-Year Program: Its Foundations," in *Science in General Education*, ed. Earl J. McGrath (Dubuque, Iowa: Wm. C. Brown & Co., 1948).

## I. AGREEMENT AND DISAGREEMENT CONCERNING SCIENCE

What science is and, therefore, how to teach it are our problems. Yet, in one sense, there is no problem. We all know what science is. There is no difficulty in distinguishing its subject matter, as may be the case with the humanities. Its subject matter comprises all natural phenomena which can be made to yield general truths when subjected to the method of science. There is no controversy over the ends and methods of science, as is often the case in research within the field of the social studies. The end of science is the establishment of general laws or truths, and it achieves its end within the limits suggested by Dewey's descriptive phrase,

"warranted assertibility." Its method is to establish the warranted assertibility of general propositions (which contain terms and relations not immediately derived from data) by referring them for verification to "stubborn and irreducible facts." This is a method which, though it may vary in detail from science to science or problem to problem, is called the "inductive method."

Described at this level of generality, not only is the nature of science well understood and agreed upon, it is also an adequate basis for many programs of study. Wherever a program is concerned only or mainly with the *conclusions* of science, and with them only for practical purposes, this general view suffices. This would hold for survey courses oriented to student "needs," where "need" is conceived only in terms of workaday applications to the technological devices of the modern home and office. It would hold also for engineering programs with a similarly restricted technological emphasis. Here the teacher may teach and the student learn the conclusions of science apart from the data and their interpretation which support conclusions, confident that the conclusions so taught and learned have all the validity which the method of science can impart. They can be sure that this validity is, on the whole, limited only by the incompleteness of data and the incomplete formulation of the problem to which the conclusions of science are always subject when withdrawn from the unending process of inquiry which produces useful conclusions but also continuously enlarges and modifies them.

When, however, the consideration of science goes beyond the general to a consideration of particular sciences as embodied in concrete examples of scientific inquiry (as it will when the objectives of a program of study go beyond the imparting of scientific conclusions for merely practical purposes), unanimity and simple certainty about the nature of science are displaced by differences of view. These differences arise when scientists and students of science are confronted by problems of method, end, and subject matter visible in concrete examples of scientific inquiry, though not noticeable from the distant and general view.

For instance, F. K. Richtmyer and E. H. Kennard, two highly respected physicists, have this to say of Newton's *Principia*—in the 1942 edition of their *Introduction to Modern Physics:*

> In this treatise the famous three laws of motion are assumed as axioms. Their greatest merit lay in the fact that they contain just enough to constitute a complete basis for the science of mechanics and no more. The laws can be expressed with a slightly greater clarity in modern terminology and we now realize that in part they express definitions rather than experimental facts, but it is commonly felt that no more *convenient* basis for mechanics has been proposed.[2]

On the other hand, R. B. Lindsay and H. Margenau, also highly respected physicists, have this to say in the 1944 printing of their *Foundations of Physics:*

> Granted our ignorance of force, . . . [Newton's first] law becomes a pious statement calling attention to a possible state of motion which may sometimes be realized in nature and sometimes not. . . . All this is very much tinged with anthropomorphism, and inasmuch as science tries to get as far away from anthropomorphic ideas as possible, is of doubtful value for mechanics. . . .[3]
>
> It is incumbent on us to provide some connected theoretical basis with which to replace the Newtonian laws and which will lead to the results which Newton and his successors have sought to draw from these laws.[4]

Clearly, these authors differ in their conception or what constitutes good science, and therefore they find in the record of Newton's research quite different characteristics to which they attach primary importance. Richtmyer and Kennard's emphasis on "convenience" and Lindsay and Margenau's subsequent emphasis on an operationalist definition of an acceptable "connected theoretical basis" suggest the basis for their diversity of view concerning the proper criteria for judging the soundness of Newton's contribution to physics.

What is suggested by these quotations—that scientists differ widely in their views concerning the nature of science—is borne out if one looks to other fields and areas of science. One sees it in the contrast between the esteem in which the theory of relativity was held in Ernst Mach's later days by many physicists and this statement of his: "I can accept the theory of relativity as little as I can accept the existence of atoms and other such dogma." One sees it in situations where the criticism of a biological study as teleological is unanswerable, and the epithet "preformistic" is a sign of departure from orthodoxy. Sherrington testifies to this diversity of view by the fact that he finds it necessary to inveigh *against* the extremists on his own side in his

[2] (3d ed.; New York: McGraw-Hill Book Co., 1942), p. 28.

[3] (New York: John Wiley & Sons, 1944), p. 87.

[4] *Ibid.*, p. 91.

plea for a physicochemical approach to problems in embryology:

> When we are told that the modern chemist and physicist cannot get on without the hypothesis that matter explains everything, a position is reached akin to that of initiation into a faith. A rigid attitude of mind is taken as an orientation necessary for progress in knowledge. Is there anything different between that and the efficacy of the spiritual exercises of St. Ignatius as introductory to mystic convictions expected to follow? What either expedient may possibly gain in intensity of insight is surely at disproportionately greater cost to breadth of judgment.[5]

As one moves closer and closer to concrete cases of scientific inquiry and further from sweeping and general views of the subject, the diversity of position among scientists becomes ever more real and significant in actually determining the direction of research and more necessary for understanding and relating researches to one another. The diversity becomes more significant because the positions involved deal specifically with questions of what kinds of data are to be preferred, what kinds of explanation or knowledge are to be sought, and what kinds of problems are to be considered most fruitful for attack in the subject matter in question. The opposition between physicochemical explanation and explanation in terms of function of parts relative to a whole (as seen in Sherrington's remarks), far from being the only conflict in biology, is only the container for more, and more specific, differences of approach. Even within the group which champions the physicochemical approach, there is a division. In D'Arcy Thompson's *Growth and Form* we find, for exical explanation as the preferred kind of scientific example, this defense of the physical as against the chemical explanation as the preferred kind of scientific explanation:

> In short, it would seem evident that except in relation to a dynamical investigation, the mere study of cell structure has little value of its own. That a given cell, an ovum for instance, contains this or that visible substance or structure, germinal vesicle or germinal spot, . . . chromosomes or centrosomes, obviously gives no explanation of the activities of the cell. And in all such hypotheses . . . which attribute specific properties to micellae, chromosomes, idioplasts, ids, or other constituent particles of protoplasm or of the cell, we are apt to fall into the error of attributing to *matter* what is due to *energy* and is manifested in force: or, more strictly speaking, of attributing to material particles individually what is due to the energy of their collocation.
>
> If we speak . . . of . . . a substance . . . which hands on to the new generation the characteristics of the old, we can only justify our mode of speech by the assumption that that particular portion of matter is the essential vehicle of a particular charge or distribution of energy, in which is involved the capability of producing motion or of doing "work." . . . The *things* which we see in the cell are less important than the *actions* which we recognize in the cell. . . .[6]

If we now turn from those scientists, who by the nature of their work give only occasional attention to the nature of science, to men with a special interest in methodology, the wide diversity of view becomes explosively clear. J. S. Mill and William Whewell are in direct conflict concerning the nature of induction itself.[7] Einstein and Henri Poincaré are polar in respect to one of the most critical aspects of method in the physical sciences—the relation of mathematical knowledge to the physical world.[8] Francis Bacon, Augustus DeMorgan, and Morris Cohen with Ernest Nagel represent three distinct positions concerning the propriety and place of hypothesis in scientific inquiry.[9] Descartes can question the very use to which sense-data are to be put.[10] Newton, in his aphoristic "hypotheses non fingo," inveighs against the use of *mechanical models* for explanation and asserts the superiority of conceptual *quantities* as the appropriate form of scientific knowledge.

Diversity of view concerning the nature of science is then an inescapable fact. And this inescapable fact implies one immediate caveat to architects of liberal programs in the natural sciences. The caveat is that no one doctrine concerning the nature of science can be exclusively employed as a principle of organization and interpretation or taught by the architect in the pro-

[5] Charles Sherrington, *Man on His Nature* (New York: Macmillan Co., 1941), p. 136.

[6] (New York: Macmillan Co, 1945), pp. 287–89.

[7] J. S. Mill, *A System of Logic*, Book III, chap. ii; William Whewell, *On the Philosophy of Discovery* (London: J. W. Parker & Sons, 1860), chap. xxii.

[8] Albert Einstein, *Sidelights on Relativity*, Vol. II: *Geometry and Experience* (London: Methuen & Co., Ltd., 1922); Henri Poincaré, *Science and Hypothesis* (New York: Science Press, 1905).

[9] Francis Bacon, *Novum Organum*, Aphorisms, Book I; Morris Cohen and Ernest Nagel, *An Introduction to Logic and Scientific Method* (New York: Harcourt, Brace & Co., 1934); Augustus DeMorgan, *A Budget of Paradoxes* (London: Longmans, Green & Co., 1872).

[10] René Descartes, *Meditations on First Philosophy*.

gram he develops. To employ only one doctrine as a principle will give rise to a biased view of the nature of science, and to teach a single doctrine could be to the student only misleading or confusing or both, because no single doctrine is more than a partial statement—partial in the sense of incomplete and partial in the sense of being based upon a given set of epistemic or metaphysical presuppositions.

We shall discuss in a later paragraph a constructive proposal with which to replace the all too common doctrinaire treatment of scientific method. Our present problem, however, is to return to the inescapable fact of diversity of view concerning science and to note certain causes of this diversity which are themselves important considerations in planning and teaching a defensible liberal program of science.

### II. SOURCES AND KINDS OF DIVERSITY ABOUT AND IN SCIENCE

The causes of diversity significant to a liberal program in science are of three kinds. The first of these is found in philosophy. The second is found in science and concerns the reflexive effect of doctrines about science upon the practices of science. The third is also found in science and concerns the variety of problems and subject matters which science investigates.

Concerning the cause of diversity which is philosophical in origin, one must consider philosophy for a moment as a branch of scholarly inquiry. It has problems of its own which it investigates much as science does. The problems are various: they may be ethical or deal with aspects of the state and society; they may treat difficulties arising out of considerations concerning the nature of knowledge; or they may be involved in a theory concerning the nature of reality. For many of these problems, one aspect or another of scientific inquiry is relevant as a source of data. But, as the problem attacked by the philosopher varies, so does the aspect of science which is his source of relevant data, and the particular relevant aspect is incorporated into the solution to the philosopher's problem. It is appropriate there, and the conclusions embodying it, if valid when measured by the canons of philosophic method, are also valid if taken as applying only to the problem which the philosopher sought to solve. Difficulty arises when we interpret the philosopher's solution to his particular problem as being a solution to the general problem of the nature of scientific inquiry. So misinterpreted, the philosophic statement cannot appear otherwise than as incomplete and biased in favor of its own epistemic or metaphysical presuppositions; for it is then being misapplied to a problem more extensive and more complex than the one it was intended to comprise. It *can* be made to throw light on some aspect of scientific inquiry and thus give us the benefits of scholarly study of the nature of science, but only if we are, first, careful to note the problem to which it addresses itself and, second, willing to apply the disciplines which enable us to see the particular aspect of science to which the problem is relevant and upon which the solution throws light.

David Hume offers a clear example. Misread as a treatise on the nature of science, he can be readily interpreted, and often has been, as showing the untenable character of causal relations as the object of scientific investigation. He is variously alleged to have sounded the death-knell of "cause," to have exhibited its viciously metaphysical nature, and to have shown that there can be no such thing as scientific evidence for asserting one class of thing or event to be the cause of another. If he is so misread, one is forced to wonder how biology, and especially physiology, could have been so stubborn as to have gone serenely on investigating causes, reporting them, and basing a reasonably successful system of medical practice upon them. One answer is that Hume's document is not a treatise *on* science and does not condemn causation as an object of investigation. A glance at his title reveals that his work is a *Treatise of Human Nature*, in short, a treatise in psychology. In the light of that fact, a re-examination of his remarks on cause reveals that his principal terms are those of psychology: *idea*, *impression*, *perception*, *association*, *habit*, *observation*, and *experience*. His problem, in so far as causes were concerned, was not whether the causal relation was a meaningful object of investigation but how it was to be investigated and how the results of investigation were to be interpreted. His conclusion, therefore, is not that knowledge of cause is untenable but only that it is probable rather than certain, that belief in a given causal relation is founded upon the repeated observation and experience of contiguity and antecedence-consequence between instances of the "cause" and instances of the "effect," and not upon detection of the act of *causing* itself. In

short, he describes precisely how science investigates causal relations and the sense in which the products of such investigation are worthy of confidence. He condemns only a particular misunderstanding of the evidential and existential status of the relation we call "causation."[11]

Here, then, is an example of the way in which virtual or demi-philosophies of science tend to develop during the train of interpretations which usually intervenes between an original philosophical statement and classroom presentation. It points to the unsoundness or incompleteness which characterizes single doctrines of science and the teaching of a single, summary doctrine of science; it emphasizes the need for careful treatment of such doctrines. It suggests the need for presentation of several views of science in such a way that each doctrine will point to inadequacies or errors of others; for, although the example here given is one of overinterpretation of a doctrine, such doctrines, even thoroughly interpreted, are neither complete nor perfect theories concerning the nature of scientific knowledge. If, then, any given doctrine is either sweepingly general or, if specific, then also incomplete, to use one such doctrine is clearly to lay one's self open to the charge of falsehood or special pleading.

The second educationally significant cause of diversity is to be found not in philosophy but in science. It is, as suggested earlier, real variation in the pattern of scientific inquiry stemming from the reflexive effect of doctrines about science upon the practices of research scientists. From time to time certain "philosophies of science" or philosophic documents which can be read as treatises on science appeal to the practicing scientist, and his conduct of scientific investigation is modified to a greater or lesser degree by the doctrine that he has read and approved. This will often be true for significant segments of an entire field of science for a considerable time. Thus, despite the fact that, in one sense, methodological studies take scientific investigation as their data, it is also true that scientific investigation often stems from conclusions of methodology taken by the scientific investigator as guiding principles. Some of the same alternative epistemic and metaphysical presuppositions which initiate different doctrines about science, therefore, are also found initiating different researches in science itself. (It is of interest to note that this two-way relation between doctrines about science and scientific inquiry is the same two-way relation which holds between published discoveries about human behavior in general and the effects of knowing about these discoveries upon the behavior of the very organisms which they describe—the two-way relation which makes the problem of scientific knowledge in the social sciences so difficult.)

Examples of this influence of doctrine on practice in science are numerous and almost commonplace. The language and emphases of operationalism appear in the scientific literature of physics soon after the popularization of the doctrine as a philosophic point of view. The theological orientation of Newton's investigation of astronomy is no more obvious than the commitment of many twentieth-century physicists to the positivist doctrine of Ernst Mach. When we speak of the effects of new philosophic conceptions of knowledge and of investigation upon a Galileo, we are speaking of a kind of influence which continues to function. Espousal of a simple mechanistic position by zoölogists and psychologists in the years just before and after the first World War is no less a reflection of "usage . . . akin to initiation into a faith," than is Goldstein's contemporary insistence on a holistic approach in biology or than what is suggested by a recent meeting of biologists frankly titled "Symposium on Teleological Mechanisms." Not only was Newton influenced by a doctrine; his work also became an influential doctrine. The years following the success of his *Principia* are characterized not only by the enormously successful effort to found other theories in physics and chemistry upon mechanics but also by a number of less significant biological researches which attempted to reduce a great deal of biology to fluid and solid statics and dynamics. In our own time the physiological and medical journals exhibit quite clearly a reaffirmation and new emphasis on a somewhat similar conception of physiological explanation following the successful extraction in useful quantity of heavy hydrogen and other isotopes. "Tracer" techniques quickened biological research along these lines; the increase in this kind of research was followed by emphasis upon the doctrine of physicochemical explanation as distinguished from organ physiology and explanation in terms of the relations of organs and organ systems to the organism as a whole. And the

[11] David Hume, *A Treatise of Human Nature*, Book I, Part 3.

combination of these examples and precepts can be seen to have influenced biomedical research not only in the frequency of publication of this kind of research but also in the assignment of grants-in-aid by foundations and the policies of new institutes, subdepartments, and special projects in the biomedical divisions of universities and governmental research agencies.

A third kind of diversity significant for the planning of a liberal program in the sciences was earlier said to be that diversity which is concerned with the variety of subject matters and problems which science investigates. It would be tempting to say, for the sake of distinguishing sharply this and other diversities, that the third category *stems from* the subject matters and problems of the sciences. Such a characterization is plausible; even a casual contrast of representative researches in physics and biology, for example, exhibits a high degree of differentiation, if not a sharp demarcation, between the two in respect to the kind of investigation which is brought to bear upon their respective subject matters and the kind of knowledge of the subject matter which is sought. The attempt to determine covariant quantities and numerical constants is the commonplace of physics, for example, and rare in biology. On the other hand, the attempt to discover classes of events which are absolutely or usually invariant in their temporal sequence ("causes") is a commonplace of biology and rare in physics. The notion that this third category of diversity *stems from* consideration of the subject matter and problems is plausible, then. It is very difficult, however, to establish by evidence. It is much more likely that, of the whole body of diversities of method which can be seen in science, some have undoubtedly been suggested to scientists in their struggle to comprehend their chosen subject matters, and others, whatever their origin, have come to be attached by scientists more to one subject matter than to another because of their peculiar appropriateness there. It would be best, therefore, to characterize this body of diversities as those which show definite correlations with one or another subject matter or with one or another kind of problem.

It should be emphasized that what is meant by "correlation" is not mere statistical frequency of association and disjunction, although this would be part of the story. What would distinguish this category of diversities from the others named is that here one finds associated with a given subject matter or kind of problem a kind of investigation, some properties of which have discernible relations to properties of the subject matter. A high degree of variability is said to characterize a sample of any biological phenomenon, by contrast, for example, with the uniformity of samples in chemistry. Such a high degree of variability in biology would constitute a special recalcitrance of such a subject matter to investigation aimed at formulating equations which express a fixed relation between quantitative variables. On the other hand, the concept of *organism*, with all that it implies concerning complexity and organization, is far more meaningfully applied to living systems than to nonliving systems. Such a concept implies the notion of a battery of "functions" which analyze the whole activity of the organism into part-activities. These part-activities, in turn, suggest an analysis of the structure of the organism into parts and extended research aimed at assigning structures to functions and also aimed at mutual correction and refinement of the original analyses. These steps describe a pattern of research, a "method" which is peculiarly suited to a particular kind of subject matter.

A further example of appropriateness of method to subject matter can be seen in the way that physical subject matters have been amenable in a high degree to a method for systematizing variability. The method consists in inventing and precisely defining certain "ideal" bodies, whose defined properties are such that variability in measurements of some property of real bodies can be referred to the "ideal" body and can be codified and measured with considerable precision as measured deviation from the "ideal."

One of the most obvious examples of codification in terms of an "ideal" is seen in the classical treatment of the impact and rebound of bodies. Data on comparative relative velocities of balls before and after impact suggested that equating momentum before impact to momentum after impact and relative velocity before impact to relative velocity after impact constituted central tendencies which expressed the behavior of bodies in impact, but with extreme variability from one kind of body to another. It was Newton who reduced this variability enormously by inventing the notion of "perfect elasticity" and by so defining it that deviations from expected velocities could be expressed by a number which can be considered a measure of the deviation of

real balls from "perfect elasticity" (the coefficient of restitution).

The "ideal gas" for the purposes of kinetic molecular theory is another case in point. So also was the "freely falling body" during the many years between Galileo's development of the conception and the production of vacuum pumps adequate to the task of creating nearly perfect vacuums.

Taken together, these cases exemplify the method of "idealization" which has been so fruitfully applied to the broad subject matter of the physical sciences and less so in the physiological aspects of biology. Taken separately, the same instances exemplify the diversity from problem to problem *within* a subject matter. Thus the coefficient of restitution is appropriate to one problem (or narrow subject matter) and the freely falling body to another.

Here, because we have moved away from diversities about science as a whole, through divisions of the sciences, almost to the level of particular researches, the diversity in pattern of research which can be seen is enormous. It is so large that one must legitimately raise the question whether any practicable account of it can be taken, even in specialized programs of education, much less in liberal programs which have broader responsibilities. The answer, it seems to me, is twofold. On the one hand, it is quite impossible to "cover" diversity at the level of particular problems, in the sense that survey courses try to "cover" a subject matter. On the other hand, the role of particular invented terms and conceptions in particular conclusions of science is both universal and decisive. Since liberal programs in science have as one aim to impart an understanding of the nature of conclusive formulations in science, illustration of the part that conceptions and terms play in these conclusions is desirable. Moreover, since liberal programs as well as others in science intend that conclusions learned for their own sake (rather than as examples of conclusive formulations) be understood as fully as possible, it follows that the conclusions which are taught should be taught with full cognizance of the meanings and roles of the particular terms involved in them. Thus two tasks can be performed at once. And the economy visible here is multiplied many times if, as will be suggested in detail latter, the whole business of teaching the nature of scientific knowledge be performed inductively. For such a purpose the teaching materials would be sets of examples of scientific inquiry; each such example would serve simultaneously to impart subject-matter content and to illustrate aspects of the nature of scientific knowledge at many different levels—from the most specific level at which the paper falls (e.g., inferring causal connections in physiology from ablation and replacement experiments) through the level of the subscience (e.g., physiology) and the level of the broad special science (biology) to the level of science-as-a-whole.

One example will suffice to show the decisive role which terms and conceptions play in both the investigation of phenomena and the understanding of the conclusions so derived.

A few years ago, one interest of biologists in the behavior of lower animals took the form of testing their tropistic response to various stimuli. A tropism meant, among other things, a turning or moving in response to an environmental stimulus. The movement, if it occurred at all, could be either toward or away from the stimulus, such movements being called "positive" and "negative" tropisms, respectively. An investigation of tropistic response to light of a certain species was attempted by the usual method of so placing an aquarium containing the animals that light entered it from only one end, the other end being, in consequence, relatively dim. Other environmental factors were presumably equally distributed throughout the length of the aquarium.

One responsible investigator performed such an experiment and reported finding the population of the aquarium bunched very near its light end. He concluded, therefore, that the species in question was positively phototropic. Another responsible investigator reported a similar experiment upon the same species in which he found the animals clustered near the dim end of the aquarium. Hence he concluded that the species was negatively phototropic. Attempts to explain the apparent contradiction in terms of interfering environmental factors and in terms of differences between the two populations of experimental animals failed.

Eventually the difficulty was resolved by an examination and subsequent rejection of the term "tropism" for this particular purpose. Examination of the meaning of the term clarified its all-or-none characteristic. That is, "tropism" could be answered to in only three ways: it could be positive or negative or not at all. Ignoring

the zero state, since the experimental results did not require it, it became clear that the simple alternative of positive or negative *response* implied a similar pair of alternative *stimuli*, which in this case were lightness and darkness. The terms admitted any degree of undiscriminated *lightness* above some threshold, provided that a sufficient contrast of relative darkness were also available. The absolute intensity of light was not specified or suggested by the term "tropism." Discarding it, a third investigator examined the situation in the light of the notion that organisms moved not toward or away from a given stimulus but toward an "optimum intensity" of the stimulus. He was able, operating with this term, to demonstrate that the animals of the first and second investigations were at substantially the same absolute light intensity. Their movement toward the "optimum intensity" had been disguised as "contrary" movements by the interpretation which the term "tropism" had pressed upon the data. Results which appeared contradictory when viewed in terms of "tropism" became consistent and informative when viewed in terms of "optimal intensity."

Thus one's choice of terms is seen to emphasize certain facts in a situation at the price of obscuring others. One's choice of terms determines what appears relevant or irrelevant to a study; they indicate, literally *point to*, the area or aspect of phenomena from which data are to be drawn. It is this general function of terms which needs to be understood if the student is to have an informed understanding of the nature of scientific conclusions. It is identification of the particular terms involved in particular conclusions, and some appreciation of what phenomena are not indicated and which are emphasized by the chosen terms, that constitute an adequate understanding of the specific conclusions as valid statements applying to the physical world. To know the existence and effect of terms, moreover, is to grasp the fact that science grows not only by increased precision and discovery of new phenomena but also by redefinition and replacement of terms, so as to illuminate larger aspects of phenomena or to relate aspects of phenomena previously disjoined.

It should be noted that the "tropism" case cited as example is not to be taken as evidence for the universal superiority of "quantitative" over "nonquantitative" forms of knowledge. The tropism concept has been a fruitful source of knowledge and, indeed, has emphasized some aspects of animal behavior obscured by the notion of "optimum intensity." The point is not the superiority of one kind of term over another but the universal and decisive role which is played by terms in scientific knowledge.

### III. A PREFATORY CODIFICATION OF VARIETIES OF SCIENTIFIC KNOWLEDGE

Presentation of a taxonomy of scientific inquiries would, under any circumstance, be an act of presumption. Where the taxonomy is for a special purpose, careful statement of limitations in validity are all the more demanded.

The tentative schematism to be suggested here does not pretend to be philosophically complete. It is intended only as a partial aid to the solution of a problem in the planning and teaching of a liberal program in the sciences. The problem is whether, in a liberal program, to treat scientific inquiry as consisting of one method or of many. The problem arises because liberal programs are committed to teaching students to understand the conclusions of science and to understand the nature of scientific knowledge. The problem, then, is whether the nature of scientific knowledge is understood as far as is useful or necessary for the purposes of liberal education if it is understood only as a single set of general terms. Such sets of terms do exist, and several of them can be defended as applicable to all scientific inquiry, as suggested earlier in this paper. Science, for instance, is inductive, and what is not inductive is not science. Since induction implies the movement from particulars to more general statements, one can also say that scientific knowledge is a synthesis and interaction of facts and ideas. In these, as in other general descriptions, however, the result is to make the term "science" highly ambiguous, since much humanistic study (e.g., history, philosophy, or art criticism) also moves from particular to general and involves synthesis of facts and ideas. Hence, even if liberal understanding means only the ability to distinguish science from other kinds of knowledge or inquiry, such uniform and general terms are hardly adequate.

Even if general descriptions of science permitted classification of an investigation as scientific rather than historical or other, they would still be inadequate for the purposes of liberal education. Liberal education aims at understanding. For the purposes of understand-

ing something, to put it in a class has only a preliminary —though peculiarly important—function, and this important preliminary function is not served by classifying an investigation as simply scientific. To identify an inquiry as scientific rather than historical has only the same preliminary function as the identification of a pathological state as diabetes or of a book as a novel—namely, to guide one's further actions in respect to the thing classified. In the case of a literary genre we are guided in our reading and appreciation. In the case of a disease we are guided in the treatment aimed at cure or amelioration. In the case of an inquiry aimed at knowledge we are guided to comprehension and evaluation. Comprehension and evaluation of a scientific investigation involves knowing the kind of data employed in an investigation. It means knowing the relation of the abstracted data to the whole body of phenomena from which they were drawn. It means knowing the kind of induction employed, that is, the kind of involvement of data with ideas which is used by the investigator to convert the particularity of his data into the general character of a scientific conclusion. Since there are several *kinds* of induction and since there are different kinds of ideas appropriate to different kinds of facts and related each to each in different ways, merely to identify the presence of induction or of interaction of facts and ideas is not a sufficient guide to comprehension and evaluation. One must know enough of the various kinds to grasp the particular interaction before one. One must know enough of the problems involved in the verification of each kind of induction or synthesis to estimate the adequacy of the case in question. In brief, operative understanding—knowledge capable of use—concerning inquiry must, like operative understanding anywhere, involve both the general and the less general, the concrete as well as the most abstract.

It is this need for generality *and* generic concreteness which points to the usefulness of a tentative taxonomy, for, if inoperative generality is one extreme, equally ineffective chaos is the other. In the one case, one merges all scientific inquiries into an indistinguishable mass. In the other, one equally oversimplifies the pedagogic problem by insisting on the individual difference of every inquiry from every other, on the unique standing of every investigation. Both are true. There is something common to all scientific inquiries. There is something unique to every one. These are obvious truths concerning any class and its members, and they are not the points at issue. The point is to find a pedagogically practicable mean between these two pedagogically inoperative extremes—one which will function in the student's mind as an aid to the analysis and evaluation of the particular scientific investigation before him.

It is to this practical purpose that our tentative taxonomy is addressed and not to the theoretical purpose of an exhaustive treatment of the problem. It is subject, therefore, to the restrictions and modifications applicable to any practical proposal. He who uses it must adapt it by contraction or expansion to the exigencies of his particular use—exigencies created by his faculty, students, and circumstances. Furthermore, it is not proposed as something to be presented to students to learn, for this could lead only to more detailed placement of things in categories. It is intended instead as a prefatory guide to the curriculum-planner in his choice of materials and subject matters and as an aid in the analyses of scientific researches which he and his students do.

So much for the restricted purpose of a prefatory taxonomy. It also has three serious limitations in subject matter, of which the author is aware. Two of these stem from the fact that the scheme is not planned to distinguish the main subject-matter divisions of science from one another but treats science as a whole. One consequence of this is that the scheme must inevitably exhibit errors or omissions arising from the author's relative ignorance of those major subject matters in which his training is least. This can be remedied only by time and the criticisms and emendations of others. A second consequence is that, by being directed to science as a whole, matters special to one or another subject-matter division are lost. This should be remedied by supplementation. The author has such a supplementary schematism of method in biology in process of development. Others in the physical sciences are desirable. A third limitation is that the taxonomy presented here treats science only in terms of kind of conclusion, kind of data, and mode of verification. Epistemological and metaphysical considerations are minimized; that is, interpretations and evaluations of scientific as against other modes of knowing are not represented, nor is there any attempt at prescriptive statements about sci-

ence based on epistemological or metaphysical doctrines. A compendium or schematism of interpretative and evaluative views of science is, then, another future agendum.

The prefatory taxonomy here presented has been constructed on the basis of three principles. The first principle defines the universe which the taxonomy comprises. The second defines what is meant by a pedagogically significant difference in method. The third principle orders the different methods so distinguished.

The universe treated by the taxonomy excludes methods which are only possible, hypothetical, or rare. It includes only such methods as correspond to a number of recognized and accepted researches in one or several fields of science.

The distinguishing definition is as follows: If a pattern of inquiry is characterized by aiming toward a kind of formulation of its conclusions which can be distinguished in form from other inquiries; and if that kind of conclusion requires a kind of data which can be distinguished from the data of other inquiries; and if for validation of the conclusion the data are related to the conclusion in a way distinguishable from the relations in other inquiries, then one has a pedagogically significant kind of scientific inquiry. In short, a "method" is deserving of separate consideration if the kind of knowledge that it aims at is linked to a kind of data and a mode of validation which differ from the kinds of knowledge, data, and mode of verification characteristic of other methods. The looseness of this definition would be inexcusable in a theoretical treatment. Its practical justification lies in whatever usefulness the results of its employment may have.

The third principle orders the distinguished methods according to their complexity and partly according to their incorporation into subsequent methods. Thus the first method is simplest in respect to the ordering among facts which it achieves, and its results are likely to be used as data or principles by methods subsequently described.

*Taxonomic science.*—The most ubiquitous of the kinds of scientific knowledge is taxonomic knowledge. Its ubiquity can be seen in the fact that some kind of classificatory schematism lies at the foundation of all the sciences and in the fact that the method is a conspicuous and active feature of modern zoölogy, botany, medical syndromy, and, to a lesser extent, geology and chemistry.

Taxonomy aims to establish a classificatory schematism as its form of scientific knowledge. Its first, raw data are all the members of the objectively delimited universe to which it addresses itself and all the properties of these members which can be discerned. Its method, in theoretic ideal, consists of determining (by "induction") the one or several "essential" properties from among the indefinite number presented by the members of the universe. These essential properties then define a set of classes among which each member of the universe will find a place and only one place. Verification, again in theoretic ideal, consists of demonstrating that the schematism in question does possess the properties of exclusive and exhaustive placement of the members of the universe.

Unfortunately, the conditions for this theoretical ideal either do not exist or are not now acceptable to scientists. The result is that, for each item characteristic of the method listed above, there is a "practical" substitute. Conspicuous among the absent or rejected conditions is the notion of "essential" property or properties. Some philosophers have warned against the notion, and many scientists have heeded them. The result is that the notion of "real" species with their "essential" features is practically never defended in practice. Instead, properties are chosen and classes established on the basis of these properties, in terms of an intended role or purpose of the schematism in some subsequent body of research aimed at other and more complex kinds of knowledge. Thus in zoölogy the primary taxonomy of animals is based on properties chosen for their capacity to relate their possessors according to evolutionary sequence and proximity of a common ancestral group. Thus "blood relationship" defines "real" groupings, and homologous structures (common embryogeny and presumptive common phylogeny) replace essential structures and properties. The result of this inextricable involvement of animal taxonomy with evolution is that researches with other interests require other taxonomies which cut across the primary, phylogenetic taxonomy. Ecological studies, for instance, require their own, based upon the environmental niches occupied by organisms or based upon the place of each organism in a web of predator-prey relationships.

A similar shift can be seen in the case of the physical

sciences. Early physicists, concerned primarily with dynamics and statics, distinguished "primary" and "secondary" properties (e.g., size, shape, mass, and motion, as against taste, color, odor, texture, etc.) on metaphysical or epistemological grounds. Mechanics retained this same division of properties, but the primary properties are now seen as those appropriate to the problems which mechanics treats. As the chemical branch of physical science solved many of its problems and turned to others, more and more of the previously "secondary" properties were admitted to the "primary" rank and became involved in chemical taxonomy (e.g., color, taste, solubility, etc.).[12]

A second missing condition for an ideal taxonomy is that of an objectively delimited universe. The universes with which each taxonomist deals are bounded, but the boundaries are set by moving, rather than by fixed, criteria; for, in the last analysis, the universe within which a taxonomy is sought is itself a large class among a number of large classes. These large classes are the products of a taxonomy, usually historical rather than individual in origin, stemming from divisions of the sciences, specializations of techniques, and the existence of a number of separated theories and consequent groupings of unsolved problems. Thus even the taxonomy of animals differs in some marked respects from plant taxonomy.

In practice the universe within which a taxonomic solution is to be found is given to the researcher by the tradition which defines his field of specialization, by the theories which are current and effective, and by the problems which these theories pose. Then, as some of the problems are solved, the theories are revised to comprise the new solutions; the revised theories suggest new dimensions to the taxonomists and propose new problems; the new dimensions and the new problems loosen the boundaries of the universe treated by the taxonomist and admit new members to it. Often the new members of the universe find a place in a heterogeneous or "wastebasket" class developed for them; but eventually they are assimilated thoroughly into the taxonomic system by such revision of the whole system as will allow a place for them appropriate to the theories which introduced them and adequate to the new problems which these new theories pose. The major shifts in disease taxonomy (syndromy) illustrate the effective relationship between taxonomic and other activities in a science. Hippocratic disease taxonomy is centered around symptom-clusters, prognosis, and amenableness to certain treatments, with physical and personality typing and climatological factors taking a lesser place and material causative agents a role lesser still. With the growth of physiology and pathology and the advent of the germ theory of disease, the taxonomic schematism of disease underwent extensive revision, reflecting the new status given to causes and the consequent reduced emphasis on other properties of disease. At the present time psychosomatic theories are introducing another and similar alteration in medical taxonomy. Physical and personality typing is given greater emphasis; specific physiological and parasitic causes are subordinated to other kinds of causes, and the symptoms themselves are read differently and given new significances. The consequences to the taxonomy are the collapsing of some previously separated disease conditions into one, the separation of former single diseases into two or more, and the identification of new ones. This phase of medicine is, of course, only beginning, and its fate and the extent of the change that it may bring about in disease syndromy are not to be predicted. Nevertheless, it illustrates the process of change in taxonomic science and the relations of such change to establish theories and currently given problems.

As a consequence of shifting boundaries and criteria, which move with the growth of knowledge, the third property of an "ideal" taxonomy is also lost—the property of exhaustive and exclusive classification of the membership of the universe. These properties are only approached, not reached. Borderline or ambiguous instances are commonplace, and a few unclassifiables are tolerated.

From the point of view of research, then, a practical taxonomic schematism is verified to the extent that its results are effective tools for the problems in which the classified universe is involved and the degree to which the properties of exhaustiveness and exclusiveness are reached within the system.

Analogically, for the purposes of liberal study, a given taxonomic system is understood when it is seen as one of several alternatives: when the properties on which it is based are seen in their relevance to repre-

[12] It is interesting to note, however, that mass (weight) and atomic number still play special roles in the periodic table of chemical elements.

sentative examples of the theories and problems of the field which uses the taxonomy; when the lesser relevance of other properties to these theories and problems are noted; when the classes created by the chosen properties are seen effectively participating in other kinds of researches in the field; and, finally, when some of the doubtful areas of the taxonomy are seen and some of the reasons for their doubtful status understood.

Perhaps nowhere is there such violent contrast between common practice in general survey courses and what might be in a liberal program than in respect to taxonomy, especially animal taxonomy. A classification of the invertebrates and vertebrates is usually given with no sign of analysis or criticism, often followed by some single highly arbitrary phylogenetic "tree," proffered with no more than a vague and general caveat, which then drops out of the student's sight and mind. The student is given access to the properties chosen for criteria and to the classes which they create, but the very existence of alternative properties is usually ignored and, along with them, the sound and good reasons for the use of the properties chosen.

*Measurement science.*—By "measurement science" I mean a simple, quickly describable pattern of inquiry at the roots of physics and chemistry and presently taking hold in biology. This pattern of inquiry has as its aim the measurement and consequent co-relating of changes in two or more varying, and presumably objective, quantities. The relation of degree of immersion of bodies to their specific gravity in hydrostatics is a familiar example. The relation of light intensity to distance from source is another. So also is the relation of vibration frequency to length in pendulums and stretched strings, and the behavior of freely falling bodies. This is the kind of science whose fruits are most commonly the referent of the term "scientific law."

Here the data required are obviously precise measurements; and verification is partly synonymous with precision and partly the problem of guaranteeing the absence of any effective variable except the ones measured. There are, however, two possible complicating features.

One of these complications is the notion of "ideal body" referred to above. Although in some cases what is reported as the fruit of measurement science is some statistical central tendency of actual measurements, such as mean or mode, it is often true that what is reported is some "ideal case" toward which actual measurements can be interpreted as tending. The inverse-square law of light intensity, for example, though based on measurements of light from real sources, is itself a report of the behavior of light from a "point" source, which is, by definition, an approachable but not attainable ideal. The notion of such ideal bodies and an understanding of the particular "ideals" involved in a given equation are necessary for a liberal understanding of the fruits of measurement science.

The second complication in measurement science arises from the abstractness or unreality of a statement of relations between two or three variables which are studied apart from the $N$ other variables which may normally affect the measured ones. Such abstracted treatment is, of course, an entirely valid mode of inquiry. It is universally a part of science. But its existence and possible effect in each given instance should be a part of the liberal understanding of conclusions based upon it. The problem of abstraction will be treated more fully under causal science.

*Causal science.*—The term "cause" has become so generic that it is practically useless for a taxonomy of scientific inquiry. At one time or another it has been used as the name for the product of every kind of research. Currently it means about the same thing as explanation and description taken together and undistinguished. (Hence the commonplace textbook preface statement that "Science is the search for causes" is perfectly true because it merely says what the etymology of the word "science" says, namely, that "science" is the search for knowledge.) "Cause" is made to mean any knowledge whatever about a class of things or events which relates that class to some other class. Consider, for example, the discovery and report that all members of the class constituted of hydrochloric acid, sulphuric acid, nitric acid, etc., are made of some variable factor and a hydrogen ion. When it is interpreted primitively, one has simply identified the constituent material of each member of the class and noted that one such constituent, hydrogen, is common to all members. When interpreted in respect to the class, its material constituent is found to be hydrogen. This invariant constituent material can then be called the "cause" of acidity. Thus the "cause" of a class of things can mean sim-

ply the material substratum coexistent with a given bundle of other properties.

On the other hand, the properties which originally define the class are usually records of the interaction of members of the class with members of other classes. Thus acidity originally meant a sour taste, color changes in certain plant dyes, and combining with bases to form salts. These are events, motions, or changes over a temporal span, and one can ask the question, "What class of events invariably, in our experience, precedes *this* class of events, e.g., color change in the plant dye, etc.?" The answer to this question is then often called the "cause" of the color change, of the sensation of sourness, or of the formation of salts. Here "cause" means invariable antecedent event. Yet the color change of the dye, the sour sensation, and the salt formation are the defining properties of acids. Taken together they *are* acidity. Hence the discovery of the event or events antecedent to these defining events is as much the discovery of the "cause" of acidity as is discovery of the common material substratum of the things which possess the defining properties.

A third sense of "cause" is seen in researches aimed at determining a limiting stable state to a series of events arranged in their causal (in the sense described above) sequence. In such researches one first arranges the classes of events in their causal order as defined, then attempts to determine a stable limiting case in terms of which the preceding series of changes can be understood. The preceding changes or events are interpreted as tendencies, as steps or stages toward the limiting case, and in this sense the limiting case can be called the "cause" of the preceding events. In this sense "cause" means a concluding or climactic stage in a process. Active research along these lines is rare at the present time, but the products of past research of this kind are constantly in use. A descriptive embryology, for instance, which failed to relate the changes during embryogeny to the adult state of the organism would be enormously limited in its value to both practice (medicine) and theory (experimental embryology).

A fourth sense of cause arises when one attempts to combine all three of the kinds of causes into a single, unified scheme. When we see that a class of things made of a given material substrate participates only in certain classes of events (i.e., can have only certain effects) and fits only into a certain place in a series, many of us are constrained to act as if this concatenation, too, is not without significance, that there must be a reason (i.e., a "cause") why things made of this kind of matter behave in this way and have this place in a series. There thus arises the notion of a cause of causes, an essential cause. Sometimes the unity thus sought is found by identifying one of the three first-order causes as the essential one. The place of the class in its series and the effects that its members have on members of other classes are understood as derived from the material substrate; or its material substrate and its effects are understood as deriving from its place in its series; and so on. In other instances, however, a distinct *quartum quid* is sought as the unifying factor. The theory of atomic structure can be seen to play this role. The events in which a given chemical compound can participate, the elements which constitute it, and the place of these elements in the Periodic Table are all explainable in terms of the number and arrangement of particles which constitute the atoms of the elements comprised in compounds.

It is easy to see that the *quartum quid* in the case of atomic theory—and in many other cases, too—is not a distinct fourth. The particles of the atom are obviously a material sub-substrate of the original compounds. The absence in much research of a distinct fourth kind of cause can be interpreted as part of the rejection of the concept of "essence" mentioned under taxonomic science. Rather than seek a fourth kind of cause, most contemporary scientists prefer that its role of unifying other causes be realized by pressing one of the other three farther back: one seeks the material element of elements; attempts to place two or more series into a series of series; links antecedent-subsequent chains into larger and more complex webs.

What disposition are we to make of this congeries in a taxonomy of patterns of inquiry? In view of the confusion and ambiguity introduced by calling these several patterns of inquiry "causal," it would be helpful if we could distribute all of them into other parts of the scheme. To a great extent this can be done without violence to truth and with a net gain in pedagogic usefulness. Most researches aimed at discovery of material substrates are understandable for the purpose of liberal education as contributors to taxonomies, as one part of the problem of establishing useful categories and of placing members therein. Some part of antecedent-sub-

sequent research can also be interpreted intelligibly in the same way. Another part of it is reducible to researches aimed at correlating quantitative variables. In similar fashion a large part of researches aimed at establishing limiting cases to steps and stages are interpretable in taxonomic terms, with the addition of the notion of hierarchical relation among the members of the class along with the notion of simple inclusion. Finally, almost all cases of research aimed at second-order causes (causes of causes) fall under the heading of analogical or *as-if* science, yet to be described.

However, when every defensible disposition of "causal" cases to other categories is made and every defensible translation into other terms of the notions involved in cause is achieved, there is a residuum. Some researches will fit into other categories only by Procrustean cutting and omitting. There is, in short, a kind of problem which requires a category other than taxonomy, quantitative correlation, and analogical relation. Moreover, this kind of problem shares sufficiently in the notions of cause outlined here to justify its being so named.

This causal science is found wherever some system of mutually interacting and mutually determined parts acts as a concerted whole. Such systems are seen in their most complicated and eminent degree in the subject matters of physiology and sociology. In the one science the organism is such a system; in the other, society.[13] The defining features (interaction, mutual determination, and concerted action) are clearly seen in both cases. In the case of society, interaction is seen in the extent to which the actions of each member of a community affect what others do. Mutual determination is seen in the extent to which it is true that the individual is a vicious abstraction—that is, the extent to which the traits and characteristics, the attitudes, abilities, and personality, of each "individual" are determined by his community and his part in it both as child and as adult. Concerted action is seen wherever communities act in relation to one another or in relation to a circumstantial problem.

In the case of the biological organism the same defining functions hold. The interaction of parts is the commonplace of physiological regulation, of maintenance of the internal environment. Mutual determination during development is the prime subject matter of embryology. Concerted action is, of course, the very sense of the term "organism."

Restricting ourselves, now, only to physiology, the problem of understanding such a subject matter as the organism is posed by the fact that the whole organism is far too complex to be understood in its unanalyzed unity. On the other hand, analysis for the sake of experimentation and understanding leaves us only with abstract knowledge of parts and pieces, radically altered by the very isolation which is required for experimentation. There is the further problem of somehow reconstructing knowledge of the whole from our merely compendious knowledge of the parts.

A start is made by the simple methods of ablation and addition. One simply removes a part or doubles a part of the organism and notes the differences between the nonnormal experimental organism and the normal. The variants of this primitive pattern are codified in J. S. Mill's "Four Methods of Experimental Inquiry."[14] These four methods—the Method of Difference, of Agreement, of Residues, and of Concomitant Variation —are the basis of a major part of the oversimplified and uninterpreted "scientific method" of elementary physiology textbook prefaces.

The prototype of this uninterpreted version of Mill is given by the question, "What organ or other part of the organism performs function X?" or by the converse, "What is the function of organ (or other part) X?" Says the Method of Difference: Consider the organs or parts A, B, C, D, F, among which previous knowledge gives us reason to think is the part which performs func-

[13] By linking the biological organism and society as two examples here, there is no intention of spinning a loose analogy whereby what is found true of biological organisms is also alleged of societies. Before such an analogy can be taken seriously, it would have to be shown that the relations of parts to the whole in each are substantially the same in three respects: (1) the extent to which each part's existence and activity are made possible by and subordinated to the whole; (2) in respect to the kinds of activities which are subordinated; (3) in respect to the nature of the relations which bind the parts to constitute the whole. These similarities have not been demonstrated and, as far as this author can see, do not exist. Society is a different kind of system, an "organism" in a sense as different from a biological organism as is, say, the "organism" of an organic molecule with its respective radicals occupying their places in its structure and playing their respective "roles" in the pharmacological effects of the molecule.

[14] Mill, *op. cit.*, Book III, chaps. vii and viii.

tion X. By surgery, chemistry, or pathology remove or inhibit the action of organ A. Note whether function X has or has not disappeared. Repeat with each organ and each combination of organs. The results then tell us, says the oversimplified version of Mill, the sufficient and necessary cause or causes of function X. In the reverse experiment, the role of organ X in the intact organism is said to be given by the observed functional deficiencies in an organism lacking organ X.

Such an interpretation of the method of physiology would give us a catalogue of organs, each with its separate functions. This would be sound knowledge, were the animal or plant body assumed to be a compendium of objectively separable functions and anatomical parts. An organism, however, is a *system* whose parts and functions mutually determine one another and act in concert. Says Haldane:

> When we speak of the "function" of an organ and regard this function as what it does to restore the internal environment we are thinking in terms of a misleading conception of what an organ is and what an organism is: for we are thinking of only one side of its activities to the exclusion of others which are just as important. To put this into philosophical language we are thinking abstractly, or regarding only a part of the reality we are dealing with. We can speak more correctly of a function of a part of a machine: for this does nothing else than fulfill its function provided the machine is assumed to be perfect and stable. In a living organ however we are dealing with something of which the functions, if we speak of functions, are endless, since the activities are endless, constantly seeming to grow in number as we investigate further.[15]

Haldane could have said (and later does say) the same thing concerning anatomy as he here says of physiology: anatomizing (whether gross, microscopic, or chemical) yields parts which, if we can speak of parts, are abstractions. They are so far abstract rather than real "parts" that each "part" which is separated by anatomy and used for the purpose of research concerning functions can fruitfully be coupled with another "part" to constitute a larger and more complicated "part" or be further analyzed into smaller "parts," all of which, when employed in the Mill methods, yield more knowledge which must be built into the knowledge previously sought and found in terms of other degrees and ways of anatomizing.

These constitute two factors, then, which must be taken into account when interpreting the results of ablation and addition experimentation: the functions are abstractions, and knowledge framed in terms of them must be understood as restricted and qualified by the mode of abstraction. Parts or separated structures are also abstractions, and functions ascribed to them must be taken as meaningful only as related to researches which employ more minutely analyzed parts and more complexly related parts. These two factors are related to the notions of concerted action and interaction found in the definition of organism.

The third note of the definition—mutual determination—points to a third factor in terms of which isolated researches must be interpreted and related to other inquiries. There is sufficient evidence of "regulation" in even the most complex of organisms to make it highly improbable that an organism minus a part presents a functioning minus precisely the "normal" function of the part removed. There is too much known of "double insurance," compensation, and adjustment in the organism to assume that in any case of ablation some aspects of the normal role of the organ removed have not been compensated for—"taken over"—by what is left. Conversely, one cannot be sure but that some normal roles of organs anatomically intact have not been altered by the removal of another part. Thus the symptoms of diabetes following removal of the pancreas are far less acute if the pituitary gland is also removed.

The limitations here cited do not, of course, affect the validity of researches of this kind but only their oversimplified interpretation. In the progress of inquiry the anatomical identification of the adrenal glands is followed by their removal in physiological research. The complex of functions thereby discovered points toward further anatomical analysis of the adrenals and discovery of two anatomically separable parts, the cortex and the medulla. Separate querying of the functions of these parts leads to still finer analysis into more minute realms of histology and thence to chemical and physical "parts" and "functions." Thus more and more numerous, accurate, and detailed statements of functions are derived.

However, this progress opens the need for more inquiry in the contrary direction. As our knowledge of parts and functions becomes more numerous, detailed, and precise, the problem of *inter*actions and *inter*rela-

[15] John Scott Haldane, *Organism and Environment* (New Haven: Yale University Press, 1917), pp. 84–85.

tions of these parts and functions becomes more pressing. The more parts we know more about, the more onerous and difficult is the problem of understanding their interconnections and thus constituting from our knowledge of the parts the knowledge of the whole which is our aim.

"Causal" research, then, upon a subject matter which is a complex of interacting and mutually determined parts constitutes a kind of science with its own problems of procedure and interpretation, differing widely from other patterns of inquiry. For a liberal understanding of the results of such researches, the student must be aware of the problems posed by the organism as a subject matter. He must be prepared to discover, in the records of such research, answers to the questions of what kinds of "parts" are being treated, what analysis of "functions" is being employed, how these "parts" and "functions" are related to the parts and functions of other related researches, and how, if at all, the researcher in question relates his discovered functions and parts to one another to constitute larger units more nearly approaching the unity of the organism as a whole.

*Relational (analogical) science.*—By "relational science" I mean those patterns of inquiry which are most fully understood as aiming toward knowledge which attempts to "explain" or "account for" matters previously known by inventing co-related quantities which do not have one-to-one literal correlates among the phenomena to be accounted for, or by inventing mechanisms not directly accessible to observation but so conceived and applied to the phenomena to be explained that it can be said that certain things behave *as if* these mechanisms existed.

This pattern of inquiry may also be called "analogical," since it may be described as applying relations seen among one group of phenomena to another and thereby establishing a new relation among the two bodies of phenomena—the relation of analogy. The core of the method may be described in three steps. It consists, first, of the "borrowing" of sets or systems of relations dissociated from the relata among which they were found. The second step consists of finding those aspects of the phenomena under consideration which can be fitted as relata to the borrowed system of relations. The third step consists of elaborating the relations or adding or substituting others so as to assimilate more and more of the aspects of the phenomena under consideration into the system of relations.

Description in these terms throws an interesting light on a much-discussed point of scientific knowledge —the respective advantages of mathematical as against "model" explanations. Examined in the terms used here, this question reduces to a matter of two different sources from which relations may be "borrowed." In the case of "model" explanations, they are borrowed from other systems of physical things. In the case of mathematical explanations the borrowed relational system is a pure one, connecting no relata whatever until employed by the physicist or other relational scientist.

Certain advantages and disadvantages of each source are immediately obvious. Because mathematical systems of relations are free of physical relata, they are indefinitely flexible and various. They may take any form that the inventiveness of the mathematical genius can provide. As such, they constitute a source of novel and complicated systems of relations whose production is not limited by the progress of physical science.

On the other hand, to employ the knowledge of previous physical science (the term "physical" is here being used in contradistinction to the purely relational) is to tap still another source of relational systems of probably equal value. Systems borrowed from real relata have, however, one peculiarity in their use: the scientist who borrows them is usually never quite completely able to dissociate the relations themselves from the relata which they originally contained. The result is that he is both stimulated and restricted by the ghosts of these relata. He is stimulated in the sense that the ghost relata suggest ways of applying his borrowed relations to new phenomena. He is also stimulated or assisted by the ghost relata, in that they themselves function as connections or relations to still other phenomena with other relations on which the scientist may draw for needed additions or complications of his system. They act as restrictions in so far as they may blind the scientist to flexible uses of his relational system through restricting his examination of new phenomena to aspects suggested by the ghost relata but which are not necessary restrictions in the use of the relations. Thus many students of modern atomic theory have difficulty freeing themselves from the habit of trying to translate the mathematical relations which describe atomic struc-

ture into relations familiar in our experience of grosser bodies.

As representative of this kind of scientific knowledge, an interpretation of the Mendelian gene theory of heredity illustrates certain aspects of it which will be useful to our conclusions concerning science education. According to this interpretation, one emphasizes, first, the absence of one-to-one relations between the data and the terms of the theory. One notes that the immediate subjects of observation—the data—are simply the numbers of individuals in successive generations which resemble one parent, the other, or neither. These numbers are converted into ratios, and generalizations are then made concerning the ratio of offspring of given types to be expected from parents of specified types. So far, one has the kind of knowledge second in our list—the co-relating of variable and presumably objective quantities. It concerns hereditary *characters*, visible aspects of the organisms studied.

Mendel now turns to a discussion of quite another subject—hereditary *factors*, unobserved, unmeasured, taken as the causal precursors of the hereditary *characters* and assigned such frequencies and behaviors during germ-cell production and fertilization as would account for the ratios and combination series of *characters*.

At this point two different interpretations are possible. On the one hand, one can take the position that the "factors" of heredity and their postulated behavior constitute a physically stated model of the expansion of a binomial to the second power and of the combinations which are the products of two or more squared binomials. According to this interpretation, further research would consist largely of investigation of more varied and more complex breeding situations, with consequent complication of the algebra of particles which describes the results obtained. From such a point of view the hereditary factor has only a *conventional* status; it is a simple, clear, and economical way of talking and thinking about the relative numbers and combinations of hereditary characters.

On the other hand, Mendel's discussion of hereditary *factors* may be taken as a hypothesis concerning real, physical things—a hypothesis to be verified by an actual, visual search designed to reveal such particles, if they exist, and to make way for a direct investigation of their properties. According to this interpretation, the failure of such a search, after an appropriate interval, would require that the notion of such particles, however convenient for descriptive and predictive purposes, be dropped in favor of some other which would again be subject to direct, sensory discovery for validation. (In historical fact, both these interpretations were entertained and both kinds of research pursued successfully.)

Under the convenient, or conventional, conception, however, use of the notions, whether the particles were found to have physical existence or not, would continue to be proper as long as the notions were convenient and economical devices of description. Moreover, revision of the properties assigned to the particles could take place at each discovery of new aspects of breeding phenomena without reference to possible real properties of real particles. Conversely, if it should prove desirable to bring knowledge of breeding behavior into relation with knowledge of some other phenomena and if the new combination proved refractory to subsumption under the particle theory, the theory could be dropped forthwith in favor of some other which would serve the new and larger purpose.

From this contrast the nature of the data for such a mode of inquiry and what it requires for verification become clearer. The data appropriate for such an investigation are any data whatever which can be related to one another by being related to the borrowed model or system of mathematical relations. There is an important corollary to this conclusion, suggesting a balancing disadvantage to the breadth and freedom of investigation which characterizes this kind of scientific knowledge: Since any data which can be subsumed under the given model or system are appropriate, then any which cannot be so subsumed are inappropriate. This apparently empty negative assumes significance if one asks what might happen were a given model or system to prove extraordinarily successful. Should such a system or model be especially clear, precise, and economical in its subsumption of a given large body of data but be incapable of bringing that body of data into relation with some other, it is a question whether the previously successful model would willingly be dropped in favor of one which, though it subsumed both bodies of data, did so clumsily and uneconomically by contrast with the first. In such a situation previous success might tend to prevent the co-relation of phenomena which might prof-

itably be related. Whether this extreme of conservatism occurred or not, it is clear that the data which would be sought by scientists in possession of a successful system or model would be those suggested by the model and its previously subsumed data. In short, one is forced to note that not only do data in part determine theory but that, conversely, theory tends to a similar degree to determine what data are sought and co-related to each other. Theory certifies the relevance of data as much as data certify the validity of theory.

What constitutes verification of this mode of knowledge also becomes clear. It consists, in the first place, of the precision and completeness with which the system in question subsumes the data for which it was chosen. In the second place, the curiously aesthetic criteria of simplicity, economy, austerity, and elegance apply. And, in the third place, the capacity of the system to assimilate new data—that is, to exhibit relevance and connection among phenomena previously unrelated in our knowledge—takes a high place.

Here, then, are four modes of scientific investigation, four species of inquiry, distinguished in terms of the form of knowledge which they seek, the data that they require, and the canons of validity that they employ. The differences among them are such that the conclusions arrived at by each can be well understood and evaluated only if one has operative, effective knowledge of their mode of validation and of the difficulties of interpretation, limitations, and qualifications which stem from the data sought, the formulations aimed at, and the relation of these data to the formulated conclusions. Without this knowledge, the conclusions so achieved by science are only half-appreciated or more than half-misunderstood. With this knowledge, on the other hand, the student is prepared to evaluate and comprehend the fruits of science. And by coming to such knowledge through informed discussion of the records of such inquiries, by an inductively aimed analysis of scientific works, the student comes to knowledge both of nature and of scientific inquiry; he learns to appreciate both the subject matters of science and science as a subject matter. The study of "method" and the study of "content" rather than divorced, to the impoverishment of each, are thoroughly wedded, to the enrichment of both. Scientific knowledge thus gained is least likely to be parrot-knowledge, for the student knows each conclusion in terms of the evidence which established it, the competitions with alternative formulations through which it has won its way, and the revisions which it has undergone in the continuing process of inquiry. Knowledge *about* science thus gained could not be parrot-knowledge, for there will have been no speeches or prefaces about science to copy. Instead, the knowledge will be operational—gained, practiced, and perfected by operations of analysis, comparison, contrast, and criticism practiced upon varied examples of scientific inquiry.

Before we go on to a summary discussion of the educational implications of this diversity of science, one generic feature of the four species here described should be pointed out. This feature is related to the notion of the cumulative character of scientific inquiry, the idea of an ongoing process of inquiry which always assimilates the past into the present and prepares present knowledge for assimilation into knowledge of the future. This cumulative character of science is often pointed out in general terms. Here in the four species described we see its origin and nature. In taxonomic science the need for a taxonomic system arises from the pressure of unsolved problems of many kinds. The schematism constructed successfully in the light of these needs solves many of the problems which gave rise to it. In this sense the taxonomy is seen to assimilate the past knowledge which generated the problems which, in turn, gave rise to the taxonomic system. But, in turn, the knowledge realized in the solutions stemming from the taxonomic scheme give rise to new problems, usually involving new data. A solution of these new problems requires a new taxonomy, and the cycle repeats itself again and again.

The same tentative character is seen in the other species of inquiry; each conclusion of science not only solves one problem but creates another; each kernel of scientific knowledge contains the germ of its own revision by pointing toward matters hitherto unknown and unrelated to one another. In causal knowledge of organisms each bit of anatomical knowledge gained through hypotheses stemming from physiology or pathology points back to needed revisions in the parent-physiology or pathology. Conversely, physiological knowledge gained through an inquiry which began with a given anatomical analysis points to revision or enlargement of its anatomical parent. In analogical sci-

ence the understanding of a body of phenomena gained by setting them in a chosen system of relations points to new phenomena not previously subsumed. The assimilation of new phenomena into the old requires revision, emendation, or even substitution of new systems of relations, and so on. It is this ongoing, unclosed character of science which creates the crucial problem of liberal understanding of scientific conclusions. And it is grasp of the specific origins of each kind of ongoing tentativeness which is the starting place for a solution to this problem of liberal understanding.

### IV. SOME EDUCATIONAL IMPLICATIONS

We have tried to describe three kinds of diversity in and about science: (1) diversity of doctrines concerning the nature of science; (2) broad diversities in science, stemming from espousal by scientists of different doctrines of method; (3) specific diversities in patterns of inquiry related to differences of subject matters and problems in the several sciences.

From all or parts of each of these come problems to face the architect of a liberal program in the sciences. We shall first state the problems, then proffer a systematic solution to the group of them.

The fact of diversity itself poses the problem; for to ignore it in an educational program creates in our graduates evils and inadequacies some of which are of deep seriousness and are obvious and visible in our students' behavior. One brute fact is that the *natural world* is a complicated affair, and no scientist worthy of the name pretends that the world in all its complications is successfully ensnared in even today's successful science. A second brute fact is that *science* is complicated; scientists who have engaged in research can view only with impatience the claim of any single system of logic, any one theory of history, any broad, sweeping philosophic view, that it describes and explains the problems which the scientist faces in his effort to wrest knowledge from the world. He may find the effort to explain his activities an interesting and fruitful one; he can no more accept one of several competitive views of his activities as definitive than he can accept one of two competing theories in science as definitive.

If, in the face of this, we teach the conclusions of science as simple and definitive solutions to its problems and, similarly, teach our personal choice of conclusions about science, we set in motion a train of evils. In the first place, we block progress toward one of the most widely held, if impossible, goals of liberal science training: to provide the student with an adequate picture of the world. To give a simple picture of a complicated world is not to give the scientist's picture of that world. By so doing we make the picture not only inadequate (which it will always be) but false. In the second place, by giving a simple picture of science we give the students a conception of the nature and magnitude of an intellectual problem shockingly different from a sound conception. What can we expect from this falsification, repeated *ad nauseam* throughout their training, except men who will find only frustration when they meet problems in all their magnitude and complication, or who will blindly simplify and vulgarize them until they fit the measure that we have taught.

The three kinds of diversity sharpen and specify these problems. Ignorance of diverse doctrines about science not only will be a contribution to the generic evil of oversimplification but, specifically, will generate academic chauvinism and intellectual intolerance. We have all seen these in two forms, not only in our students but in ourselves. One form which they take is the elevation of science above other scholarly disciplines, largely by elevating science to a level of definitive truth that it cannot rightfully claim and by denigrating the social studies and humanities to the level of sophistical refutations and defenses of opinions or to preoccupation with the unimportant. The effective and positive contrary to this state of mind is not respectful but uninformed ignorance. It is rather an informed understanding of the several disciplines by which man solves his problems and creates his worlds. It is to this understanding that an examination of diverse views about science makes one of its most direct contributions; for it is here that the similarities *and* the differences among man's several paths to truth emerge most clearly. It is only here that one can see the complex pattern of relations which bind the questions that men ask to the faculties that they have for answering them and to the world in which the raw stuff of answers lies. It is only here in the same sense that it is only in physics that one learns about falling bodies. Knowledge of both falling bodies and the processes of human inquiry can be acquired otherwise. But they cannot otherwise be acquired systematically and with economy.

The second form of intellectual intolerance is the

corruption of discussion into debate: the transformation of a process of mutual aiming toward better approximation to truth into polemical defense and attack. Discussion starts with the clear admission by all participants that one's own conclusions are based only on an incomplete view of the problem in hand. Discussion assumes that other participants may have seen more, or at least have seen other, facets of the problem. Discussion assumes, moreover, that differences in view (quite literally differences in view) can be understood and related to one another in such a manner that inferences from the larger and more encompassing whole can be made and understood and can replace the narrower and less complete views with which discussion began. Such discussion is a habit as well as a body of skills. It must begin with such experience as makes emphatic the complexity of problems and the incompleteness of answers. It must continue with such experiences repeated again and again. And it must go on to mastery of the skills by which the different facets of different kinds of problems are recognized, fitted to one another, and employed as basis for better, but still tentative, conclusions. This means, first, that where diversities exist within the subject matters of liberal education that fact itself should not be obscured. Second, the mere fact of diversity must be supplemented by substantial samples of it. Finally, the diversities themselves must be treated, not merely exhibited. Naïve relativism which replaces a dogma with diversity of dogma is no net gain. One must go on to instruction and exercise in the disciplines of comparison, contrast, choice, and synthesis appropriate to the field in which the diversity occurs. These statements are applicable to the fields of science itself, as well as to the field which treats science as its subject matter. In the latter case examples of interpretations of science—including the historical, philosophical, and methodological—would be read, discussed, and analyzed. They would be so analyzed in terms of the criteria appropriate to historical, philosohpical, or methodological problems and treatments.

In the former case instruction and exercise would treat examples of scientific investigation. It would educate, encourage, and exercise the student in applying appropriate canons of comprehension and evaluation to such examples of scientific inquiry. It is here that the vareties of scientific inquiry again become relevant; for from these come the notions of data and evidence and relation of conclusion to evidence which determine what comprehending and critical queries are appropriate to the scientific investigation in question. However, the act of critical analysis must begin with a decision as to the particular pattern of inquiry with which one is dealing; for this will determine what questions to put to the scientific paper and what kinds of answers one can expect. Since this is so, it follows that categories and kinds of investigation—scientific or otherwise—must be learned as operative judgments, not as mere schema named and described but not employed.

The existence of varieties of scientific investigation also sharpens the need for sound knowledge of science itself. Even where the conclusions of science are to be understood only in relation to the physical world which they order and describe, and not as examples of the fruits of inquiry, they cannot be understood alone. Their meaning resides in the data that they subsume and the manner of subsumption. To say that a dog is a mammal; that $A$ causes $B$; that $F = MA$; that atoms have such-and-such arrangements of particles or fields are enormously ambiguous statements taken alone. They are ambiguous not only because of the uncertain meaning of such technical nouns as "mammal," "force," "field," and "electron" but also because of a similar ambiguity in the meaning of such apparently common words as "is" in the sense of classificatory inclusion, "cause," the notion of transitive relation in the sign for "equals," and the notion of "is" in the sense of having a nature or structure. Thus the varieties of scientific investigation pose the problem of adequate instruction in science, even when and if the aim of instruction is limited to the conclusions of science themselves.

The pedagogic problems can be summarized as follows: how diversity in science and diversity about science can be treated in a fraction of a college career, especially in view of the hierarchies of diversity which exist—that is, in view of the fact that scientific researches exhibit not only a few broad differences based on doctrinal grounds but also, within these broad differences, more specific differences related to species of problems and subject matters; and, within the species, still more particular but important differences involving particular terms and conceptions employed upon particular problems.

To this summary problem a summary solution can

be proposed. The broad doctrinal differences in science, the specific differences, and the particular differences do not require independent exemplifications. Moreover, the exemplification of all need not be done independently of subject-matter mastery; for any good scientific paper is all of these at once. It is the bearer of a portion of the knowledge in its field. It "illustrates itself" as an example of scientific investigation. It illustrates the species of which it is a member and the genus to which its species belongs. (Moreover, it is a datum to the historian, philosopher, and methodologist, a point we will consider next.) Since it is all these, a knowledge of the paper can become a contribution to the student's knowledge of each of these not only in turn but to some extent simultaneously. All that is required is that instruction teach the student to ask the question of a given paper which directs his attention to each of these aspects of the paper. There will be questions directed to the comprehension of the conclusions of the paper:

What was the problem that the author set out to solve?
What are the terms in which he seeks his conclusion?
What, for him, were the data appropriate to such a problem?
What difficulties did he encounter in gathering such data?
How did he overcome them?
In what ways did he treat the data in order to move from them to conclusions?
What larger aspects of the phenomena treated were excluded by the formulation of the problem?
What, then, is the area or sense in which the conclusions are valid?

These questions and the seeking for answers to them in a scientific paper would be aimed primarily at mastery of the paper's conclusions, at understanding the subject matter of science. The paper would not be treated naïvely as a perfectly transparent and plane-parallel window looking out onto an immediately knowable world. But neither, on the other hand, would such questions treat it as a datum of history or philosophy.

Now, however, on subsequent papers, couple each such question as those above with questions calling for comparison and contrast:

How does A's notion of the problem differ from B's?
What shifts in terms or their meanings can be noted?
What difference in treatment of the data can be noted as stemming from differences in formulation of the problem or of terms?

By seeking the answers to such questions as these, the student will add to his informed and qualified understanding of conclusions a growing understanding of the magnitude of problems in science, the strengths and weaknesses of scientific ways of solving them, and the varieties of ways of solving them. He will, moreover, be teaching himself to ask such questions of papers that he will later read and even, perhaps to prefer, for reading, materials worth such questioning. Finally, he will be teaching himself *to* read and understand. He will be liberating himself to some extent from the need for a living teacher. And this last is the sign and sense of a liberal education.

The first part, then, of a systematic solution to the problems posed here is that liberal programs in science consist of (or contain) original records of scientific research, series of papers containing the knowledge of whatever subject matters seem appropriate and treated analytically and critically in the ways and for the ends suggested above. One will certainly sacrifice thereby the alleged "coverage" claimed by survey courses, but it can be questioned whether the loss is real, since it is questionable whether the "coverage" seen in arrays of lecture topics and syllabus tables of contents is ever "coverage" by the student; he may "cover" but he rarely "contains." What one gains by this sacrifice can be minds aware of what a problem is and what a solution is; men and women committed and habituated to thoughtfulness and flexibility of mind within the limits of their powers and to the extent that time and energy and informed dedication are devoted by teachers to helping them become so.

The second and last part of the systematic solution here proposed is that doctrines about science be avoided in the science program proper and appear in a separate and later course devoted to them. This is for two reasons with a common base. The common base is that we do not want merely to substitute a conspectus of dogmas for a single dogma but to make the treatment of diverse doctrines about science serve not only the purpose of informing the student of the complexities of science, philosophy, and history but also as the occasion again for the learning and exercise of analytic and critical skills. This base supports two reasons for placing doctrines and interpretations of science in a separate and later course. The first of these is that philosophical and historical doctrines concerning science are, by analogy *to* science, theories concerning the significances of scientific activities. As such, their data are the records of

scientific activities, the journals and monographs of science. It would be unscientific indeed to treat any theory apart from its data, and no less so for historical and philosophical theories. Thus the later and separate course in the nature of scientific (and perhaps other) knowledge would fall back upon the earlier substantive courses as data and, at the same time, would serve to integrate and relate the earlier courses to one another.

The second reason for placing doctrines about science in a separate and later course is a practical one. The doctrines, as has been said, are the products of historical or philosophical disciplines. Their criticism and analysis depend, then, on methods and criteria appropriate to these disciplines and differing from those appropriate to scientific works. Such materials require men trained to teach them. Ideally, the faculty of a liberal program can be expected to possess diciplines beyond the ones learned in their profession, but practically they will come to possess them only by participation in courses which require and evoke them and which are manned in the first instance by teachers who have them already. This suggests a program established by philosophers and historians from whom the scientists can learn, just as it would be wise for the science part of the program to be established by scientists from whom the historians and philosophers would learn. Such an administrative procedure has an advantage beyond adequate staffing. It would create a situation in which—in respect to one subject, at least—each staff member would be undergoing the same liberal training intended for the students. And liberal training is infectious.

# *Aim and Basis of the University**

SIR WALTER MOBERLY†

AT THIS time of crisis, in the middle of the twentieth century and after two world-wars, what positive convictions, if any, should the British universities embody? To what extent should a university concern itself with philosophies of life, and should it stand positively for any particular philosophy of life? If so, what should that be; and in what way should it be exemplified (e.g., by inculcation to students, tests for teachers etc.)? What responsibility has a university for the philosophies of life of its members? We ourselves are writing as Christian believers, desiring to bring Christian insight to the problem, "How can the university be the university?" but we have already ruled out the view that definite Christian conviction can, now or in any near future, be the basis of integration. At what then can we legitimately aim, and what can we reasonably ask others to concede? These are the most fundamental questions that can possibly be asked about universities; and yet it is just on these issues that, both within and outside the universities, there is most obviously confusion or disharmony.

We confess frankly that in answering these questions we can only make a small beginning. At best what we have to offer is an interim report. As we see it, neither the general intellectual situation nor the mind of the general body of Christians in the university world admits at present of anything more. Much further thinking and experimenting needs to be done, and the most we can hope is to contribute some stimulus towards it. But to shirk this central question altogether would make nugatory everything else we have to say. However crude or superficial our treatment, all that we have said so far leads up to it and all that is to follow springs from it.

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† Chairman of the University Grants Committee.

### I. THE OPEN FORUM

As a minimum, even if the university is officially neutral on ultimate issues, its neutrality should be "positive" and not "negative." That is, it should not exclude or discourage discussion of these frequently burning questions but should actively promote and stimulate it. We borrow the term "positive neutrality" from International Student Service, whose experience in this respect is highly relevant. In addition to its relief work, I.S.S. has for many years brought together in conference groups of students and staff, for frank discussion of the most controversial and explosive questions. In this way it has successfully brought together such apparently unmixable groups as Jews and Arabs, Orangemen and Sinn Feiners, Dutch and Indonesians, etc., to discuss the very questions which divide and inflame them. The basis of unity which makes possible the plainest of speaking without rupture is, first, solidarity as university men and women, and, secondly, personal fellowship engendered in living together throughout the conference. Such conferences are, in a high degree, educational to all who take part in them. There you meet face to face those who hold opinions and sentiments antagonistic to your own. You become aware of such views not only at long range, as something misguided and perverse to be refuted, but as the sincere convictions of men with whom you are in

immediate personal fellowship. They come alive to you, and the members of each group take a notable step towards imaginative understanding of just those factors which they have been most liable to overlook. Disagreement may still be deep, but much misunderstanding will have been removed; and when, in later life, some of these students hold key positions, their decisions are likely to be more intelligent and responsible than they would otherwise have been. But, in order to perform this function, it is necessary that I.S.S., as an organization, should be uncommitted to any side in regard to the vexed questions debated at its conferences. Otherwise it would be unable to assemble the parties.

This analogy may be applied to the university. The university "must be a community within which the chief contemporary intellectual positions . . . may enter into a living encounter with one another." At the very least, fundamental questions must not be ignored but must be asked and examined radically. How shall a man live? What are the things which really matter and what is their relative importance? To what sort of world have we to adjust ourselves? "Here arises the responsibility of the universities. They are inheritors of the Greek tradition of candid and intrepid thinking about the fundamental issues involved in the life of the individual and of the community and of the Greek principle that 'the unexamined life is no life for man.' . . . Certainly it is no part of the duty of a university to inculcate any particular philosophy of life. But it is its duty to assist its students to form their own philosophies of life, so that they may not go out into the world maimed and useless. It should stimulate and train them, not of course necessarily to think alike, but at least to think, and to think strenuously about the great issues of right and wrong, of liberty and government, on which both for the individual and for the community a balanced judgment is essential to a rational life."[1] The vital principle of democracy is that differences are hammered out in discussion. But the discussion which goes on in a university may be defective, either because it omits the really vital issues or because it treats them only at a superficial level. The radical discussion that is required is difficult and daunting, because it may not leave oneself unchanged. Yet of course to say this is easier than to mean it; and to mean it in occasional "hours of insight" is easier than to do so steadily and effectively through "days of gloom."

How does one live? Every sane and civilized man must perforce have some rudimentary working philosophy of life, however unconscious or uncritical. From hour to hour he must make decisions and do what seems best to him. Not to take such choices seriously and simply to drift is infra-human; and it is unworthy of a university man or woman not to relate them to the live issues of the time or, in so doing, to be duller or more purblind than he can help. It ought to be impossible, though it is actually common, to go through a university without ever feeling this challenge at the deep level where real decisions are made. "Upon leaving the university the foundations for an intelligent personal theory of the world and of life should have been laid."[2] Here a university, however neutral officially, has a heavy responsibility. Somehow it should impress on its students the urgency of deliberation and decision. It may be unable to offer them an agreed *Weltanschauung*. But if it cannot speak with one voice, let it speak through its teachers with several voices. The one thing unforgivable is to be silent.

If this is our policy, we must recognize that it involves the frank abandonment of the old effort to protect the student from influences that are dangerous and unsettling. In the latter part of the nineteenth century Christian parents shuddered at the exposure of their sons in the universities to infidelity and lamented the disappearance of "security from proselytism and infectious scornfulness";[3] and the Christian leaders fought long and strenuously against the admission of teachers without guarantee of Christian belief. Their attitude is stated clearly by Liddon in a letter to William Bright written in 1868. "Speaking absolutely, we know that religious truth can take care of itself. . . . But in the concrete and particular case of young men living together, tempted to every sort of moral mischief, and eager to get rid in their worst moments of the sanctions and control of religion; it is no disparage-

[1] Report of the University Grants Committee for the period 1929–35, p. 32.

[2] Friedrich Paulsen, *The German Universities and University Study*, trans. Frank Thilly and William W. Elwang (New York: Charles Scribner's Sons, 1906), p. 308.

[3] Keble's words, quoted in Henry P. Liddon, *Life of Edward Bouverie Pusey* (3d ed.; London: Longmans, Green & Co., 1895), III, 400.

ment to religious truth to say that it does need protection. . . . To treat Oxford undergraduates as in all respects men, appears to me the greatest possible mistake. . . . The question is . . . whether the sons of Christian parents are for all time to come to be made over to infidel teachers of history and philosophy, with an undisputed right to teach them infidelity." Similarly, in Charlotte Yonge's novel, *The Daisy Chain*, when Norman May while at Oxford reads some German criticism and speculation by which his faith is temporarily shaken, his father blames his rash folly; to meddle with the accursed books was to run into temptation and to taste poison. Such an attitude is understandable, but it is misguided; and it is far less plausible now than it was in Liddon's day. The dangers are incidental to growing up, and the student is to be treated as an adult. Christian training at the university level ought to include being confronted by, and not being safeguarded from, other ways of thinking. This is a tension which is inseparable from being an educated adult in a world so deeply divided as is ours. No doubt it may be urged that such a tension is all very well for the abler student, but that to bear it is beyond the capacity of the weaker brother. But the answer must be that such a "weaker brother" is probably out of place in a university, and certainly his needs cannot be allowed to determine university procedure. Faith, no more than virtue, should be "fugitive and cloistered." Such a faith must be insecure for it is one to which the holder has no real right. It is indeed Newman who, wiser than his allies, denies that the best way of learning to swim in troubled waters is never to have gone into them. In his famous tribute to the Oxford of eighty years ago, Matthew Arnold enumerates among her charms that she was "so unravaged by the fierce intellectual life of our century." But that is a thing which no university has any business to be; for the university, intellectual innocence is not a virtue but a vice.

On the same fundamental educational principle—that the student is to be regarded as an adult—the tradition that the teacher should abstain from participation in radical discussion of ultimate questions, and should be reticent about his own views, must be rejected as a false idol equally with the tradition of protecting the student. The teacher of children may reasonably scruple to express to them opinions conflicting with the beliefs of their parents or the general sense of the community. But that is because children have not yet come to years of discretion and are not yet capable of weighing and judging for themselves. At the university stage there is no excuse for depriving students of the means and responsibility of judgment or of sheltering them from its difficulties. It is a boon to students to know "what are the personal convictions of a sincere and serious man with respect to the great problems of life and world to which such a man has devoted deep and serious thought."[4] To communicate these frankly must not be regarded as a breach of professional etiquette, while to have none to communicate is a mark of professional incapacity. Thus, as Christian teachers ourselves, we claim freedom to express with a clear conscience our Christian convictions and our grounds for them. But we recognize that the same freedom must be conceded to those who differ from us. It is, for example, the right of Professor J. B. S. Haldane as of Mr. C. S. Lewis. This applies not only to "out of school" acitvities, to the evening meeting of the Conservative or the Labour Club, the Student Christian Movement or the Rationalist Society, but also to the lecture room.

It is true that there remains an essential distinction between university teaching and propaganda, a distinction which both Fascists and Communists have tended to obliterate. The teacher should not suppress his convictions for fear of being accused of proselytism; yet it is not his primary concern to make proselytes. His immediate task is to aid understanding rather than to impel his pupils towards, or away from, any prescribed type of action, to supply them with data for forming intelligent judgments of their own rather than to enlist them as disciples. But among those data should be his own conclusions and the reasons which have led him to them.

If university men must be deeply concerned with discovering a working philosophy of life, the religious issue is unavoidable. For every philosophy of life is either religious or secularist; it requires God or it leaves Him out. The Christian asserts that the reason why man is tearing himself to pieces is that he is out of of harmony with a Presence half hidden and half revealed by the façade of physical things and processes, and that the only radical or lasting cure for our dis-

[4] Paulsen, *op. cit.*, p. 241.

orders is to be found in the restoration of that harmony. This assertion is either, as we think, saving truth or, as others think, fatal error. There is no third alternative. A choice between these views is inescapable, and on any showing no more momentous choice is possible; this is common ground to Kierkegaard and to Lenin. Religion, in the words of Donald Hankey, is betting your life that there is a god; and he might have added that irreligion is betting your life that there is not a god. You can choose which way you will lay your bet, but you can neither decline the wager nor reduce your stake. Whichever way the truth lies, sitting on the fence must be futile; for it is in effect to choose the negative side without intending to do so or realizing that you have done so. We have refused to claim that universities to-day should be Christian, even in the sense in which some colleges within some of them still are Christian. But no student should go down without having been confronted by the Christian challenge. There can be no question of official pressure on him to accept it, but he should be incited to take notice of it. What ought to be impossible for him is decision by inadvertence, for that is really sub-human.

As Christians, we must realize that the supreme enemy of our cause is not the ardent atheist, the serious-minded teacher or student who, after due consideration, is impelled to reject Christianity. He is always to be regarded with respect, and in some important ways he is our ally. It is the man of trivial or merely conventional outlook who drifts through life without ever really facing the question. And each of us has to admit that his own habit of saying "Lord, Lord," is no guarantee that he is not himself one of these drifters. As against such people are linked all those, however sharply opposed their creeds, who stand for intellectual integrity and responsibility. There should be no place for such drifters in the university, not because they are specially wicked (of which there is no evidence) or specially profane (which may be irrelevant) but because they are uneducated, and apparently uneducatable in those issues which matter most.

Before we leave this conception of the university as an open forum for the thrashing out of ultimate questions, three reflections may be added. First the magnitude of the change would be great even if this were done and no more. Few who know the universities would venture to claim that fifty per cent of those who now go through them experience any such intellectual awakening as that which we are demanding, or ever make a responsible personal decision in adopting their working philosophy. Even with the minority which is alive to the larger issues discussion is often callow and superficial and does not touch the levels at which major decisions are made. This was exemplified by a University Union which once invited Dr. Joad and Father Knox to open a debate on the existence of God. Secondly, though some dons do take part with students in fundamental discussions (e.g., in meetings of the S.C.M. or of various societies with Marxist sympathies) the amount of such assistance from seniors is still small, and the university takes no responsibility for promoting it. Thirdly, what is wanted is that the university should press on the attention of students the urgency of attaining a convincing philosophy of life and should put at their disposal all possible resources for making an intelligent choice. The university authorities, Senates and Councils, Vice-Chancellors, Principals and Deans, should devote much attention to the question, "Is this happening on a sufficient scale? If not, how can it be stimulated?" For this is an educational question more far-reaching and fundamental than most of those which now occupy their attention.

### II. THE REOPENING OF COMMUNICATIONS

To be such a forum as we have described is a minimum requirement, but is it enough? Can a university rightly leave commitment to its individual members and confine itself corporately to holding the ring? This attitude has recently been sharply challenged by Mr. Arnold Nash, writing from a Christian standpoint. "The liberal democratic university," he says, "by rejecting any real attempt to discern and then to teach a unified conception of life, refuses to be a university."[5] Does not a university stultify itself if there is no coherent scheme of life for which it stands, no coherent picture of the univese which it presents? Is not that intellectual anarchy? It does not behave so spinelessly in regard to the special sciences. When it is a question of the master-science to which all these are subordinate, is the university in effect to sit back and say, "God bless you my boys, go to it"? On that showing it is all-

[5] *The University and the Modern World* (New York: Macmillan Co., 1943), p. 35.

important for the individual student or teacher to choose a way of life and, when so doing, to have heard the best that can be said for all sides; but, for the university officially, they are all on a level, whether fascist, communist, liberal-humanitarian or Christian. Students would then be like a jury which hears the witnesses and the speeches of the advocates but is without the help of any judicial summing up. But can anyone honestly believe this who to-day is a consenting party to the denazification of the German universities?

In the special sciences no one advocates so complete an embargo on corporate commitment. "The accepted technique of teaching chemistry does not imply that the Phlogiston theory has as much to be said for it as the Atomic theory."[6] Alchemy, Astrology and Phrenology are not given equal hospitality with the recognized sciences. Nor is it so in the homes and schools from which students come. Any philosophy of life may there be inculcated only half-heartedly and ineffectively, it may be implicit rather than explicit; but it can hardly be absent entirely. Are we then at the university stage of education tacitly to confess the insincerity of the earlier stages by our inability corporately to adhere to any consistent *Weltanschauung?* Would not such an inhibition be irresponsible and almost pathological? That is certainly the view of the "scientific humanists." The universities, says Brian Simon in the last words of *A Student's View of the Universities*, should "ally themselves with the forces of progress all over the world to overthrow the enemies of culture and science." This is also the clear implication of Professors Bernal and Hogben. The question here is not one of the use of tests or of proscription; it is not whether the heretic shall be tolerated, or even in some sense welcomed, in the university. It is whether all distinction between orthodoxy and heresy shall, in principle, be annihilated.

In any case is not the supposed corporate neutrality quite unreal and impracticable? A university may indeed be neutral in theory. It may abstain from identifying itself publicly with any particular philosophy of life. But in practice it is impossible to plan its studies or its corporate life except by reference to some standard of values, implied if not expressed. It is impossible to have a rational standard of values in the absence of any clear image of the ends of human existence, and that entails some conception of the nature of man and of the world. Without that, either the university will be merely chaotic—a conclusion in which no one can acquiesce—or its working philosophy will be surreptitious, unthought out and uncriticized. Such a university will be wanting in intellectual honesty; it will be too timid to make clear even to itself the body of convictions by which it is really animated. Now, in some forms of community, dominance by such a hotch-potch of sentiments, habits and archetypal ideas may pass muster. Thus Burke asserts the superior value of communal prejudices in comparison with reasoning; the presumption being that, through the operation of "the survival of the fittest," the prevailing prejudices are those which the course of ages has shown to be salutary. It is often maintained that the British temperament is such that our conclusions are more likely to be sound than our reasoning to be valid, and that it is therefore a mistake for us to try to rationalize too much. But can a university possibly be satisfied to base its attitude in regard to the deepest matters on sloppy thinking and conventional prejudice, and to substitute "One does feel" for "I believe"? In adopting a *Weltanschauung* and commending a way of life, must not its thought be as thorough, intrepid and relentless as it is in the special sciences? If anything in this region is to be handed on to students, must it not be a coherent and articulate philosophy? Otherwise the university is involved in the absurdity which F. H. Bradley long ago pointed out, that it is permitted to think only so long as it does not think strictly.

In the Middle Ages, when the universities came into being and took their shape, it was of course Theology which supplied them with an intellectual framework. Both in Great Britain and in the United States it is widely admitted that the Christian faith cannot to-day be the common conviction on which the universities rest, and we have already subscribed to this view. But is it not then imperative that some substitute should be found? If faith and revelation must be omitted and the truth of Christian dogmas must be left an open question, may there not still be found a genuine basis of unity between Christian and liberal humanists in a philosophy of life which embodies the traditional Christian values which for so many centuries were "drunk

[6] Launcelot Hogben, *Dangerous Thoughts* (New York: W. W. Norton & Co., 1940), p. 143.

in by every Western child with its mother's milk and inhaled by every Western man and woman with the air they breathed"?[7] Thus Dr. Hutchins, after stigmatizing most trenchantly the existing chaos in the American academic world, urges that metaphysics should now take the place once occupied by theology, as the master-science which gives coherence to all the others;[8] and the context shows that he means by metaphysics something very like "the perennial philosophy," that is, the "natural," with the omission of the "supernatural" part of the system of St. Thomas. This is not Christian, but it has formerly been in fruitful alliance with Christianity and might be so again. Even if it is held that the perennial philosophy requires much more revision in the light of modern thought than Dr. Hutchins would allow, is not his principle sound? Is there not here a systematic basis on which Christians can combine with others against the major heresies such as atheistic Communism, as they once combined on the basis of Natural Law, and on which the universities, at least of Western Europe and America, can build?

As between such a Christian-humanist philosophy of life and others, is there not inevitably a war which must be fought out and not shirked? Otherwise do we not cry peace where there is no peace but only a crippling and stultifying incoherence? Our universities may in effect be national institutions, for which it would be improper to go further in the way of commitment than does the national mind. But must not the nation itself make up its mind on this major issue, if it has not already done so? If it is too deeply divided for this, is not the only honest and sensible course to have more than one type of university; e.g., one which takes for its foundation the Christian-humanist tradition and another which stands for dialectical materialism? Each then can organize its life and work with intellectual integrity and a measure of purposefulness and need no longer be hamstrung by a vain and demoralizing pursuit of appeasement.

We sympathise with this line of thought. But if by a unified philosophy of life is meant a coherent system, even remotely reminiscent of St. Thomas's *Summa*, it may be a legitimate long-term objective; but, however desirable in principle, it is an impossible goal of practical policy in the near future. The present chaos and division are such that no university or group of universities could adopt an agreed philosophy without doing violence to the intellectual situation as a whole. What is possible in the immediate future is largely determined by choices which have already been made.[9] In existing conditions any "agreed philosophy" could only be an "ideology," that is, a pattern imposed on the situation and not growing out of it or organically connected with it. At the most it could be agreed between different faculties and different schools of thought only in the sense that it was not actively resisted; it could not command general, cordial and intelligent assent. "The real problem is that our diverse worlds of thought do not make sense as a coherent unity, and probably cannot and will not do so for some time to come."[10]

Vital as is the need for a common and coherent philosophy of life there is a prior and more modest but still more urgent task. Professor Emmet most pertinently continues—"We no longer live in a common civilization which speaks a common intellectual language. Hence we are beset by the problem of communication."[11] There can only be a genuine integration where minds are really in touch with, and really meet, one another; and this is just what is not happening at present. The university, like the contemporary intellectual scene generally, is a Babel. There is no common means of intercourse because the different sections dwell in different intellectual worlds. The first need is to restore communication.

The situation is like that which at present exists between the Great Powers. They have no common philosophy and no hope of arriving at one in any near future. They must somehow work together; and yet it is all but impossible to do so when their objectives and presuppositions are diverse. Any agreements they make are in the highest degree precarious, since they are prompted by different motives and are differently interpreted; and in case of divergences there are no common standards to which appeal can be made. In these

[7] Arnold Toynbee, *A Study of History*, abridgement by D. C. Somervell (London: Oxford University Press, 1947), p. 400.

[8] Robert M. Hutchins, *The Higher Learning in America* (New Haven: Yale University Press, 1936), pp. 96 ff.

[9] See Jacques Maritain, *True Humanism* (London: Geoffrey Bles, Centenary Press, 1938), p. 136.

[10] Dorothy M. Emmet, *The Nature of Metaphysical Thinking* (London: Macmillan & Co., Ltd., 1945), p. 219.

[11] *Ibid.*, p. 221.

circumstances the immediate object of statesmen from month to month must be to reach some *modus vivendi*, however temporary and unsatisfactory, so as to gain time in which some more thorough job may be attempted. And if all full and frank communication is prevented by the exixtence of an "iron curtain," that must be removed before there can be any real progress towards understanding. Similarly, in the university world the equivalent of an iron curtain shuts off different groups from all but superficial mental contact with one another. They inhabit different imaginative worlds and have different sets of instinctive convictions.[12] Behind the differences in their conscious opinions lie those deeper differences in the habitual, and no longer noticed, mental categories in terms of which they think, and the unconscious assumptions and basic acceptances which largely determine their respective attitudes. In the ordinary way such differences are never resolved. Thus a Christian theologian or philosopher may enter into public controversy with a scientist of Marxist outlook, and each may in some degree impress other people. But hardly ever does either make the least impression on the other. This is not because they are impervious to reason, but because their minds never really meet. The "man convinced against his will" who refuses to change his mind need not be simply pig-headed or perverse. The reasons for his belief which he has been able to adduce may have been roughly handled; but he feels obscurely that his real reasons are more multifarious and elusive and that they have not been touched. It is what is at the back, rather than at the front, of the mind that is decisive, and this is rarely brought into the picture.

Here the question is no longer of teachers talking freely to students but of their talking freely to one another. One day at an educational conference a hard-bitten pagan administrator heard a divine speak in the traditional language of Christian devotion and was so bored and alienated that he barely restrained himself from walking out. But then there followed another representative of the Churches who spoke in the language of the plain man. The administrator listened with keen interest. At the end he whispered to his neighbour, "You know, *I could talk to that man*. We might not agree, but I could talk to him." A real contact had been established, where before there was none. That is what needs doing at a thousand points throughout the universities. The theologian and the engineer, the doctor, the chemist and the lawyer, Sir Richard Livingstone and Professor Bernal, Mr. C. S. Lewis and Professor J. B. S. Haldane, the Provost of King's and Professor Hogben, must learn how to talk to one another on the radical level at which their "instinctive convictions" are brought into the open and their minds really make contact. When they do, things will really begin to happen. Till they do, no talk of an integrated philosophy of life for the university will be more than talk. A deeper critical awareness of our own "instinctive convictions" and of those of our own group may be the first requisite for understanding those of others. It is a two-way traffic that is required. "Real life is meeting," and the university needs much more of it. It is the penetrative imagination which can go behind what another man says to his real mind that we most need to cultivate, and our chief object in so doing must be, not to refute him, but to understand him and to learn from him. The deep reverence for personality which is inherent in Christianity makes this specially incumbent on Christians. This will involve two things. The first is a deeper and more resolute self-analysis than most of us have hitherto attempted or are likely to find at all palatable; so that we may become aware of the real grounds of our thinking and feeling and behaving as we normally do. The second is a patient and sustained effort to enter into the minds of colleagues whose interests or philosophies of life are remote from our own, in order to understand and appreciate, not only what they believe, but why they believe it. Neither of these tasks can be accomplished quickly or easily. Merely to find a psychological formula by which to interpret our own or other people's minds is not to perform but to evade them.

To make real contacts and to deepen understanding will not necessarily or speedily produce agreement. In the next stage different Faculties and different schools of thought, working out their special presuppositions, may have to go further down their several divergent ways than they have yet gone. But both agreement and disagreement will become far more fruitful when they are clarified and found to be real. Unity may well come

[12] Cf. Alfred NorthWhitehead, *Science and the Modern World* (New York: Macmillan Co., 1925), p. 5.

in the first instance by the performance of a practical common task rather than by the formulation of a theoretical common minimum. With that may go the development of a sense of fellowship which already exists in germ and which will be the academic equivalent of what the British workman expresses when he addresses a stranger as "Mate."

### III. SPECIAL ACADEMIC POSTULATES

Though the intellectual situation does not yet admit of any agreed systematic philosophy, certain basic values, elementary and elemental, are already implied in our common living and action. If it were not so, there would be no real bond between us. However highly we rate the importance of freedom of thought, we must rest it on some basis of conviction. The university is engaged in a co-operative quest for truth. But such a quest itself presupposes agreement in some underlying value-judgment, held, not as a tentative hypothesis, but with absolute assurance. We cannot without absurdity have an open mind about the value of having an open mind.

At ordinary times such basic principles may well be below the threshold of consciousness. Habit and custom may supply enough of a common pattern for practical purposes. Indeed it is arguable that an institution such as the British Empire gets on better because we do not try to work out its principles too precisely. But when basic values are threatened, as they have been in the last ten years, it becomes necessary to defend them, and to defend them we must know clearly what we have to defend. It is necessary to disentangle the essential values on which no compromise is possible from fortuitous and possibly undesirable accretions which may well be dispensed with. As Karl Mannheim puts it, "Democracy has got to become militant if it is to survive. . . . The new militant democracy will develop a new attitude to values. . . it will have the courage to agree on some basic values, which are acceptable to everybody who shares the traditions of Western civilization." And he enumerates "those basic virtues and values—such as brotherly love, mutual help, decency, social justice, freedom, respect for the person, etc.—which are the basis of the peaceful functioning of a social order."[13]

[13] Karl Mannheim, *Diagnosis of Our Time* (New York: Oxford University Press, 1944), pp. 9–10.

What then are "the basic values and virtues" which our universities to-day should commend, for which they should stand, and on which they should endeavour to build their corporate life? What are the credentials by which they are to be recognized? They have two sources. First, there are certain specific assumptions and convictions without which the work of the university cannot go on. They are inherent in the job; but they may be imperilled, either from within by some "treason of the intellectuals," or from without by political dictation as they obviously were in Hitlerite Germany. It is only those with personal experience of the working of a university from within who can determine what these are. In this respect there falls on them a special duty of vigilance; and here they have to lead, and not merely to follow public opinion. Secondly, there are other basic values, more general in character, which the universities share with the whole community. It is true that the British universities, though not State universities, are in effect communal institutions, inasmuch as they represent the whole community rather than any particular section. Hence, in general, the basic values they presuppose can only be those acknowledged by the community in which they are set. For such a university to assume any special colour, whether Christian, Communist, or Bourgeois-Individualist, which is not that of the nation as a whole would be illegitimate. But Mannheim's contention still remains—are there not some fundamental values, recognized and respected to-day by the British people? If so, should they not be acknowledged and exemplified by the British universities? In this Section we shall be concerned with the former set of assumptions; the latter will be discussed in the following Section.

Here we are concerned with assumptions on which, as academic people engaged in doing our job, we cannot be neutral, since that would be to saw off the branch on which we are sitting. The university is a Guild; it is perhaps the greatest of the Guilds which have come down to us from the Middle Ages. But every Guild evolves its own professional standards and principles of craftsmanship and its own professional ethic; e.g., the Goldsmiths, the Merchant Taylors, the Royal Colleges of Medicine and Surgery, the Inns of Court, etc. Of all such codes there are three characteristics to be noted. First, it is the members of the Guild rather than

the public who are competent to be their judge and to decide what their code should be and what is, or is not, an offence against it. *Cuique in sua arte credendum*. The innovator has to make good his case before a body of educated opinion, a jury of his peers. It is true that professional opinion tends to be unduly conservative. But reforms, and even revolutions, can only come from within. If the practice of surgery is revolutionized, it is by no quack with his panacea, but by a Lister who has himself been subjected to the fundamental disciplines. Secondly, the Guild-members are not merely the judges, but the rightful guardians of their professional principles. Against the client who wants his lawyer or doctor to do something unprofessional, sometimes against popular clamour or governmental pressure, the Guild-members have a moral responsibility for maintaining their standards. For instance—to confine ourselves to illustrations which have ceased to be controversial—it is now clear that both Fascists in Italy and Nazis in Germany imposed on their universities procedures which were not only morally wrong but professionally disastrous. Thirdly, a Guild normally accepts responsibility for the professional training of its members. It initiates novices into the theory as well as the practice of the craft; and it teaches these with authority as a set, not only of tentative hypotheses, but of articles of faith.

The special quality of such presuppositions is that they are inherent and not extrinsic. With others we may be suspicious that some sectional or outside interest is trying to capture and exploit the university, to make it an instrument for the service of some purpose other than its own, to superimpose on it some particular pattern, political, religious, social, or even aesthetic, to force it into some framework which does not properly belong to it. But such natural resentment and resistance should not blind us to the fact that there are some presuppositions inherent in the undoubted task of the university, some postulates without which it cannot proceed. Some such postulates indeed each Faculty has peculiar to itself; related, that is, to its special field and method of study. But, over and above these, there are some which are common to the university as a whole. For instance, the engineer and the theologian may be largely ignorant, uninterested and even unsympathetic concerning each other's work. But they recognize each other as genuinely engaged in the pursuit of discovery and learning and as paying allegiance to some common intellectual standards; and, on that ground, they recognize each other as colleagues. If it were not so, they would have no business to be in the same university, and each must be striving to oust the other.

Apart from discussing *what* these presuppositions are, it is important to recognize *that* they are and that they may need to be defended. But if we are to defend them, we must seek to analyse them and to distinguish the authentic from the spurious. In what then do they consist? Much further thought needs to be given to this question. What follows is a tentative attempt to discern and describe some of them. But it is only a beginning; it is offered as the launching rather than the conclusion of a discussion.

First there is the conviction that the things of the mind are worth pursuing, developed to an intensity at which it becomes an intellectual passion. Without this intellectual passion the members of a university staff become only a kind of academic civil service, doing a routine job with reasonable efficiency, but uninspired and uninspiring. They communicate no glow because they feel none. Everyone who is acquainted with universities from the inside knows that here is the difference between mechanism and life. Of course this is a platitude, but it needs insisting on; for, in some ways, the utilitarianism fashionable to-day is against its recognition. In this matter we need to preserve a delicate balance. Only yesterday it was important to repudiate academic isolationism—the precious intellectual dwelling complacently in his ivory tower, content to keep himself unspotted from the world. To-day it is equally important to repudiate the thorough-going utilitarian, who assigns to the pursuit of truth a function merely ancillary to the attainment of comfort or power by the community. An institution whose interest in truth was confined to the knowledge of how to do or to make or to mend things would not be a university.

As Christians we are specially concerned to maintain this balance. On the one hand we welcome an insistence that thinking should be responsible and should lead to action and engage the whole man rather than reflect a detached and merely speculative curiosity. On the other hand, the supreme Christian experience is not in action but in worship (which includes con-

templation, and even, in a sense, enjoyment, as well as action). For the Christian, truth is one aspect of the being of God, and to treat with contumely the cult of truth for its own sake comes near to repudiating the cult of God for his own sake. This has been put very clearly by the philosopher, F. H. Bradley, in a famous passage, "Some in one way and some in others, we seem to touch and have communion with what is beyond the visible world. In various manners we find something higher, which both supports and humbles, both chastens and transports us. And with certain persons the intellectual effort to understand the universe is a principal way of thus experiencing the Deity. No one probably who has not felt this, however differently he might express it, has ever cared much for metaphysics. And wherever it has been felt strongly, it has been its own justification."[14] Bradley is speaking primarily of philosophy. But what he says, holds good of "the intellectual effort to understand the universe" in detail as well as in the gross. That is, it applies to academic study as a whole.

A second postulate is the duty of intellectual thoroughness. In the university, arguments must be followed wherever they lead, however unexpected, and they must be followed through relentlessly to the end, however unwelcome. In the conventional detective story, the great detective, called in by friends of the suspected man to refute the police theory, warns them that, once engaged, he will regard it as his duty to discover and to reveal the whole truth whether that is favourable to his client or not; the university acknowledges the same obligation. In other departments of life there is room for conventions into whose objective basis no exact scrutiny is made, in which indeed there is often an undefined, but tacitly agreed, element of "Let's pretend." Examples are the rites of Freemasons and other Friendly Societies, the institution of Christmas as it exists for that large majority of our people who have no firm religious conviction, or the rights and powers of the Crown. For practical purposes it is needless, and sometimes undesirable, to probe or analyse these too precisely. Such a twilight between belief and disbelief has its legitimate place in some spheres of life, but it has no legitimate place in a university. For the university it is a canon that thinking must be of the utmost strictness that the subject-matter permits and slovenly thinking is taboo. Nor can there be any forbidden territory. Loyalty to this obligation is one aspect of intellectual integrity, as are the two or three which follow.

The next postulate, closely related, is the obligation to be meticulously accurate in dealing with empirical evidence. It is true that we have already disclaimed the simple-minded view that truth is attainable by nothing but faithful reception and reporting of empirical data, and we have laid stress on the vital part played by schemes of interpretation; but the empirical data are also vital. And even those whose schemes of interpretation differ widely may be held together by a common intellectual conscience in the observation, recording and taking account of such data. The classical scholar must reject the most ingenious or seductive emendation as soon as the manuscript evidence contradicts it. The historian must note and report evidence that seems to contradict the interpretation to which he has previously committed himself equally with evidence that confirms it. As to the scientist, Darwin's declaration is classical, "I have endeavoured to keep my mind free so as to give up any hypothesis however much beloved . . . as soon as facts are shown to be opposed to it."[15] Apart from such a conscience there could be no common ground, or even room for argument, between different schools of thought. As it has been put, "there is a kind of inner demon which says 'Come off it,' when we are indulging in ingenious feats of explaining things away in the interests of our own point of view, political, religious or philosophical." The evil consequences of the lack of such a conscience were seen in an extreme form in Nazi Germany. According to Dr. Jaspers the Nazi biological theories were due to "a closed mind, which translated all reasons to the contrary into confirmations."[16]

[14] Bradley is careful to preserve balance. For he continues on the next page, "There is no calling or pursuit which is a private road to the Deity. And assuredly the way through speculation on ultimate truth, though distinct and legitimate, is not superior to others. There is no sin, however prone to it the philosopher may be, which philosophy can justify so little as spiritual pride." (*Appearance and Reality* [2d ed.; London: Swan Sonnenschein & Co., Ltd., 1906], pp. 5–6).

[15] Francis Darwin (ed.), *Life and Letters of Charles Darwin* (new ed.; London: John Murray, 1902), p. 52.

[16] In his inaugural address at the reopening of Heidelberg University, October, 1945.

Fourthly, there is the obligation to approach controversial questions with the temper of the judge rather than of the advocate or the notorious "expert witness." This is totally distinct from tepidity or from a disposition to compromise. It is the fruit of a passion for the whole truth as against half-truths, for proportion as against one-sidedness. It springs from a high sense of intellectual responsibility, whose possessor is on his guard against adopting an opinion more easily because, for instance, it pleases or shocks, amuses or impresses, and is doubly watchful and critical of the unconscious operation on his mind of his own pet prejudices and sympathies. This is an obligation more easily acknowledged than observed, for the influence of non-rational and mainly unconscious motives, even on minds of very fine intellectual quality, is much more pervasive than has been realized till lately. A rare example of self-knowledge and self-mastery is shown again by Darwin. In his autobiographical fragment he speaks of his "golden rule that whenever a published fact, a new observation or thought came across me which was opposed to my general results, to make a memorandum of it without failing at once; for I had found by experience that such facts and thoughts were far more apt to escape from the memory than favourable ones."[17]

An aspect of this judicial temper is fair-mindedness in dealing with the opinions of others, particularly those which are uncongenial and opposed to one's own. This is required, not only or mainly for the sake of courtesy and good feeling, but in the interest of truth. In controversial questions, all opinions held at all widely among persons technically qualified to form an opinion at all are part of the data for judgment. There is a prima facie presumption, not of course that each of these is free from error or amounts even to a half-truth, but that it is not mere nonsense, that there is at least "something in it." So long as views which we reject seem to us nothing but "fool opinions," we ought to feel uncomfortable and insecure; for the probability is that we have failed to understand them or to take account of the grounds on which they are held. We are only fully entitled to reject them finally when we have first understood why they seem plausible to those who hold them and then have seen further. A merely combative attitude is untrue to the university spirit. That spirit is expressed by Henry Sidgwick when, writing amusedly in his diary of a visit to Keble College and of his friendship with the Anglo-Catholic, Edward Talbot, he says, "We agree in two characteristics, which are quite independent of formal creeds—a belief that we *can* learn, and a determination that we *will* learn, from people of the most opposite opinions."[18]

The fifth postulate insists on freedom of thought and publication. It is closely linked with the sense of responsibility on which we have just insisted; for responsible thinking must be allowed to find its own way, even at the risk of error, and be met by open argument. In Dr. Jaspers' words, the university "claims freedom of teaching and learning as the condition of the responsible independence of professors and students." If the intellectual conscience is to operate, it must not be constricted and hampered by extraneous interference. As the scholar or scientist will resist internal motives other than the pursuit of truth, so he will resist external pressure which must deflect it. This does not imply a reversion to the "Liberal" conception of the university in its old form, for the university need not be neutral or indifferent or take Gallio for its model. But it springs from a conviction that expulsion or silencing of heretics involves a worse evil than any which it can avert. The university is no place for the mass-production or mass-repression of opinion. The methods of the Commissar and the drill-sergeant are wholly out of place. The attempt to find a short cut involves a short-circuit.

This needs emphasis because it may be endangered. The besetting sin of academic liberalism, it is now widely recognized, was to shirk practical decisions because of the difficulty of reaching theoretical certainty; though in fact people are constantly called on to take such decisions on a basis of probability only. But that is not sufficient ground for pretending that greater theoretical certainty has been attained than the evidence warrants, for trying to manufacture it by non-rational means or for closing the theoretical debate in the academic arena.

The university, as a community in pursuit of truth, needs the potential contributions of all its members who are capable of original thought. To rule out in advance those who quit certain prescribed lines contradicts its

[17] *Op. cit.*, p. 51.

[18] Arthur and Eleanor M. Sidgwick, *Henry Sidgwick: A Memoir* (London: Macmillan & Co., Ltd., 1906), p. 403.

central purpose. The Miltonic argument is still valid. "They are the troublers and dividers of unity, who neglect and permit not others to unite with those dissevered pieces which are yet wanting to the body of Truth. To be still searching what we know not, by what we know, still closing up truth to truth as we find it (for all her body is homogeneal and proportional), this is the golden rule in theology as well as in arithmetic and makes up the best harmony in a Church; not the forced and outward union of cold and neutral, and inwardly divided minds." For *Church* read *University*, and this passage retains all its force. Any "forced and outward union" does not assist, but inhibits, the genuine union of tested conviction.

In his monumental study of the rise and fall of civilizations, Professor Toynbee traces a common cycle. Everywhere advances are due to the influence of some "creative minority." And everywhere the "creative minority" presently degenerates into a "dominant minority." Either because inspiration flags, or in the effort to get quick results and to secure the adhesion of the multitude more rapidly than the slow process of real conversion allows, the influential minority falls back on the method of "drill." Sooner or later this has two results. One is the ossification of the élite. The same policies and watchwords, even the same persons or at least the same organizations which once were the spearhead of reform, become the stronghold of reaction. The other is the eventual revolt and secession of the proletariate. The obvious moral applies with redoubled force to the university whose raison d'être is thinking things out. To exercise the influence of a creative minority is a legitimate aspiration for every group in the university. But to seek to become a dominant minority and to "collar" the university, is to betray the university.

For Christians this postulate of university life is confirmed, illuminated and deepened by their faith. On the one hand this includes a profound respect for the individual, carried to a point which to most others appears merely quixotic, but is itself grounded in the astonishing patience of God and abundantly illustrated in the story of the life of Christ. On the other is the vivid sense of human fallibility and perversion. No group is so wise and good that it can safely be given a monopoly; no group is so besotted that it has certainly nothing to contribute. We may not proscribe the heretic lest haply on some point we be found to fight even against God.

Our last postulate is the conviction that the university has indeed a social responsibility, but that this is the first and foremost a responsibility for focussing the community's intellectual conscience. No doubt it has also some measure of responsibility for the community's moral conscience. An eminent German scientist is quoted by Professor Bernal as saying, "I do not know anything about politics and I do not want to know anything about politics, because if I keep out of it I do not see how they can do anything to me";[19] and while such irresponsibility may be extenuated by the peculiar strain, most of us would agree that it cannot be justified. But that sort of responsibility falls on the individual teacher rather than on the university corporately, it falls on him as citizen rather than as professor, and it is one which he shares with multitudes of his fellow-citizens. But the university's distinctive responsibility—the task which no one else can perform—is to be the university; that is, to be a place where the criticism and evaluation of ideas is continually being carried forward, where nonsense can be exposed for what it is, and where the intellectual virtues rooted in sincerity of mind are being fostered and transmitted. Of course this intellectual conscience is not a monopoly of the university, but no other institution has an equal opportunity of engendering and of nourishing it.There are many other services which the university can render to the community, but they will be "Greek gifts" if they are given at the expense of this quintessential service. The university will betray the community, as well as lose its own soul, if it allows itself to be so anxious and troubled about many things as to miss the one thing needful.

On these academic postulates there are two general comments to be made. First, of course it is not suggested that universities are places where these convictions are regularly lived up to and the appropriate virtues practised. On the contrary, if we say that, in these respects, we are blameless, we deceive ourselves; the evil that we would not, we constantly do. But they are the standards which, by common consent, we ac-

[19] John D. Bernal, *The Social Function of Science* (London: G. Routledge & Sons, 1939), p. 395.

knowledge and hold in honour, and to which we appeal in judging our own and our colleagues' performance. Insofar as we have offended against them, we repudiate and condemn our own action. Secondly, they are put forward as "rules of the guild," tacitly agreed working assumptions, found to be necessary to good workmanship in our craft. Probably most university teachers, at least in Great Britain, would assent to them. If they are criticized, it is more likely to be as platitudes than as paradoxes. But some, if not all, of them have far-reaching implications in the sphere of ethics, of anthropology and even of ontology. If their acknowledgment does not absolutely necessitate a particular philosophy of life, it is at least true that to some philosophies of life they are thoroughly congenial and to others highly antipathetic.

### IV. BASIC COMMUNAL VALUES

Those basic assumptions which the British universities share with the nation may themselves be subdivided.

*a*) *Universal.*—Some are common to all universities anywhere, to El Azhar, Peiping and Calcutta equally with Oxford, Paris or Harvard. The convulsions of the last fifteen years have made clear that there are some values or principles which are indispensable to civilized existence. This was typified at an annual conference of International Student Service shortly before the War. The German representatives were troubled by the relief work done in Great Britain and other countries, which at that time was mostly for refugees from Nazi persecution; but they were ready to be pacified by an assurance that the basis of this work was purely humanitarian and in no way "ideological." But at the critical moment the British relief secretary jumped up and, speaking with much feeling, said, "Of course, I.S.S. is neutral, on ordinary political questions. But there are *certain elementary conditions of civilization* for which we do stand." In the words of Dr. Kotschnig, the war was widely felt to be not only a conflict between different political and economic systems, but a "clash of mutually exclusive worlds of thought and aspiration."[20] It was a war not between one civilized Power and another, but between civilization and barbarism; and in such a war the real mind of all civilized persons and learned bodies, whether expressed or not, must perforce be on one side.

Deeper than all differences of moral judgment is the difference between those who make moral judgments at all and those who do not. It is the old issue between Socrates and Thrasymachus; and it is the issue on which, humanly speaking, the fate of the world in the next few years seems to hang. What is in question is, whether those who hold power will recognize any moral standards as objective and binding on them, and as having a *de jure* authority superior to their own inclinations or interests. The problem of power is the problem of our age. But all civilization has depended on the recognition of some restraint to naked power. The universality of the recognition of the "Tao," that is, of the existence of "moral law" having authority, has already been pointed out. This recognition is part of the common cultural heritage of civilization. Here then is something for which the universities of the world must stand. For our own universities this principle was applied eighty years ago by the chief philosopher of Liberalism. In his Rectorial Address to the St. Andrew's students, J. S. Mill laid down that the proper end of their studies was that they should be come "more effective fighters in the battle between good and evil," and that universities should have a pervading tone of reverence and duty. In this he was at one with Carlyle, Shaftesbury and Pusey, and indeed with Confucius, Marcus Aurelius and Kabir.

Mr. Lewis's examples go to show that the traditional wisdom of different civilizations includes not only a recognition of Duty as something peremptory and absolute, but a good deal of agreement about the kinds of conduct which Duty enjoins. Here only one or two examples can be given. One is the duty of reasonableness. When Hitler first came into power, a distinguished German who was then in this country remarked that this event was the triumph of irrationalism and betokened an uprush of forces from the psychic underworld. That is something towards which universities cannot be neutral, for it is a condition of civilization that the beast in man should be subjected to the man in man. Another duty is good faith. "Keeping of faith," says Locke, "belongs to man as man and not as a member of society." No reasons of State or business excuse a breach of covenant; without mutual trust, so-

[20] Walter M. Kotschnig, *Slaves Need No Leaders* (London: Oxford University Press, 1943), p. 11.

cial intercourse becomes impossible. Another duty, important though hard to define, is that of a good will of man towards man, a certain free-masonry between fellow-members of the species which is the exact opposite of the natural enmity affirmed by Hobbes, a disposition to treat others as friends so long as they do not show themselves to be enemies.

On this basis the peoples of all civilized communities can meet. Here the universities of the world cannot be neutral, since civilization cannot be neutral. If any student or teacher advocates irrationalism or Machiavellianism or inhumanity, he may indeed be tolerated for reasons we have already given; but he is definitely a "dissenter" and unrepresentative, for in this respect his mind is in contradiction with the mind of any university.

*b*) *Western.*—Secondly, there are some further principles which are common to the contemporary civilization of the West. Europe and America have a common cultural heritage, derived mainly from Greece, Rome and Palestine. There are some truths concerning the good life and the conditions of attaining it on which these are agreed, and one function of Western education will be to pass them on. "Our society, like any society, rests on common beliefs and a major task of education is to perpetuate them."[21] This is the contention of the Harvard Report, *General Education in a Free Society*. The writers are clear that an educational system must have some common purpose which holds it together; that, in the United States, this purpose once was to make Christians citizens, that in existing conditions it can be so no longer, and that some alternative must be found on which the Christian and Humanist, Professor Niebuhr and Mr. Lippmann, can unite and that the source of such an alternative is to be found in "the intellectual forces which have shaped the Western mind."[22] Of these forces Christianity is one, but it is one among others.

The Nazis proclaimed a "war against the West." In so doing they recognized, though by repulsion, that there was a moral tradition, common, e.g., to the Latin and to the Anglo-Saxon peoples, which constituted a standing obstacle and rebuke to their aims and methods. This again is more easily perceived than analysed. But it is not hard to identify some judgments characteristic of the Western mind. First there is a certain activism, a sense that it is normally right to be up and busy. An obstacle is something to be removed; an evil is something to be redressed. Fatalism is not a Western creed, and it is no accident that Applied Science is a Western product. Secondly, from Greece has come the conception of the good life as embodying the cardinal virtues of wisdom, temperance, courage and justice; and from Rome an ingrained respect for law and order. Fatalistic and irresponsible inertia, unbridled indulgence of appetite or self-will, cowardice in all its forms, injustice and anarchy, are decisively condemned by our Western tradition. Thirdly, there is a Palestinian element in our Western heritage. Though the extent of its survival to-day is disputed, its place in the historic tradition is not. "The Christian virus or elixir is in our Western blood."[23] This deepens the Roman demand for even-handed justice by adding a respect for the individual as possessing rights and responsibilities. The Harvard writers define their moral basis as being the dignity of man and his duty towards his fellow-men. But, however defined, its practical importance lies in what it excludes. Men are never to be treated simply as slaves, cannon-fodder, as beasts of burden or as material for scientific experiment. Whoever holds otherwise is a heretic. On such issues Western civilization has not an open mind but a firm conviction. It is against this moral heritage that so much that has happened in Europe in the last fifteen years is a gross offence.

*c*) *British.*—Thirdly, over and above those principles which they share with the universities of other countries, there are certain basic values for which the British universities may legitimately stand, since they are inherent in the British way of life. They are a part of the heritage which, in 1940, our people rallied to defend. Our political history notoriously suggests that there is some such common, national, basis of belief. Our party-differences have not been carried to an extreme. After a General Election, the party newly returned to power does not undo the bulk of the work of its predecessors. The outlook which Mr. Churchill and Mr. Attlee have in common is more important than

[21] *General Education in a Free Society: Report of the Harvard Committee* (Cambridge: Harvard University Press, 1945), p. 46.

[22] *Ibid.*, p. 44.

[23] Toynbee, *op. cit.*, p. 401.

the things in which they differ. The national unity in time of war only expresses and reveals an underlying unity of standard and of purpose which is there all the time.

From this unity there arises directly the first of these basic values. That is tolerance, or, as it has been recently described, "our habit of not killing one another." The parties to our contentions are not implacable. The sombre drama of Thucydides, Book III, has not been enacted "in England's green and pleasant land." Class-war has not hitherto disrupted our society as it has disrupted others. No doubt this trait has its reverse side, a lack of intellectual thoroughness and moral intensity. But, primarily, it is based on tacit recognition of a fellowship more fundamental than all the Isms that divide us. "Fraternity" is that one of the revolutionary triad which we rate most highly.

A second of our national basic values is illustrated by the paradox that this country is the home both of the "Rule of Law" and of the "Sovereignty of Parliament." We can dispense with legal checks on the sovereign body because, in practice, the moral authority of tradition and the informal pressure of public opinion give sufficient security that it will not abuse its powers. Similarly, we can dispense with the police-state, because we can rely on a general habit of spontaneous cohesion and conformity; people take their places in the queue without being hectored by someone in uniform. Irrespective of party, we believe in ordered liberty and in self-discipline. With this goes an ingrained belief that a balance between continuity and change is both needful and possible. In making alterations the style of the building should be preserved; but "a state without the means of some change is without the means of its conservation." So we cherish the *critic* on the hearth, and "His Majesty's Opposition" is one of our most characteristic institutions.

A third of our basic values is represented by the conviction that, "democracy is meaningful and right."[24] Of course, "democracy" is a highly ambiguous term. But, in this context, it clearly does not imply any particular political arrangement; it signifies a broad ethical test by which political arrangements are to be judged. As such a test, it seems to be twofold. On the one hand, it emphasizes the claim of every man to consideration. Government should be "for the people." "The poorest he that is in England hath a life to live as the richest he." That strikes a chord to which something deep in our nature responds. On the other hand, it expresses the community's need of the active co-operation of all its members in ordering the common life; and, seen from the opposite angle, this is the right—and obligation—of every man to a share in responsibility. In some real sense government must be by the people.

All this is fairly obvious. These are values which few persons of influence in our universities would question. Humanists, whether theocentric or anthropocentric, can easily agree upon them. But, so far, they are vague and superficial. In quiet times they may supply a common ground on which we can get along without digging deeper. But are they deeply rooted enough to enable us to stand against the impassioned communist or fascist at a time when events are forcing on us, in the most practical and insistent form, the question: Do we really believe what we have supposed ourselves to believe, and, if so, with what depth of conviction do we believe it? At this level a further question is unavoidable. In the body of common conviction, unformulated but actually operative, which the British universities share with the British people, how far, and in what sense, is there a definitely Christian ingredient? There is no suggestion here of reviving the idea of a "Christian university" which we have definitely rejected. But, if there is any significant sense in which it was "Christian civilization" that the nation defended in 1940, it may follow that the culture which British universities diffuse should in some degree be a Christian culture.

### V. DO THESE VALUES INCLUDE A CHRISTIAN INGREDIENT?

Among the British universities to-day, broadly speaking, the ancient do, and the modern do not, make formal acknowledgment of a Christian basis. Which are right, and with which is the future? Is the Christian profession of Oxford, Cambridge and the Scottish universities only a historical survival, having no longer real point or meaning, a venerable façade behind which there is only emptiness? Ought Cambridge, equally

[24] We take this phrase from the Harvard Report, where it is used to express the basic presupposition of American universities (*General Education in a Free Society*, p. 44).

with Chicago or even with Calcutta, to preserve an official neutrality between Christianity and other religions or between religion and rationalism? Or is the absence of Christian orientation and Christian profession in "Redbrick" an unnecessary and crippling impoverishment? Behind this lies the question: In what sense, if in any, is the British people still a Christian people? On this the only comment which can be made with confidence is that the answer is not simple or easy, and anyone who thinks it is rules himself out of court. In the nature of the case, any answer must be impressionistic and cannot admit of demonstration, and, in attempting an answer, academic people speak with no special authority; yet, in practice, some answer must be presupposed.

*a) Prima facie evidence of Christian influence.*—Great Britain, unlike the United States, is officially a Christian country. Both south and north of the Tweed there are "Established Churches," whose dignitaries have an assured status in the realm. The Coronation of the King is a religious ceremony. Assizes and the daily sessions of Parliament are opened with prayer, and prayers are said when foundation-stones are laid or ships are launched. On great occasions national days of prayer or thanksgiving are appointed, and, by at least a substantial section of public opinion, this is felt to be natural and right. In his broadcast addresses to the nation, the present King constantly stresses a religious appeal; and, speaking as a responsible Minister in a time of crisis, Sir Stafford Cripps calls on his fellow-countrymen to refresh their hearts and minds with a deep draught of the Christian faith as the most potent source of our inspiration. As regards their personal lives, a very large proportion of our people are still christened, married and buried under the auspices of the Christian Church. Nor are these Christian professions only survivals from the past. The Butler Act embodies a new national affirmation of Christian allegiance. While it leaves full freedom to parents or teachers to contract out, it makes Christian worship and instruction a normal and statutory part of the life of the school.

Behind all formal observances Christian "archetypes" have, very noticeably, coloured the ethos of our people in a number of ways. For instance, the soldiers in the ranks during the last two wars showed often a personal warmth and a tenderness towards any of fellows in trouble, which went far beyond recognising other men's rights and giving them their due. In quality and motivation, this still falls far short of the true Pauline "charity," but it is doubtful whether it would be found in the same degree in men whose tradition did not include the story of the Good Samaritan. Similarly the marked readiness of the British soldier to succor and befriend his enemies as soon as they lay down their arms is not due simply, as critics would have it, to infirmity of purpose, but owes something to the peculiarly Christian ideal of forgiveness and to the New Testament record. Both these traits are rooted in an understanding of human nature that is richer and deeper than their possessors can usually express. They have a dim sense that "man is more than can be known about him," that there is something inexhaustible in their neighbour and in their duty towards him, and that the whole end of life and the whole hope of man do not consist in "the being used for a purpose recognized by yourself as a mighty one, the being thoroughly worn out before you are thrown on the scrap heap."[25] The humour and humility, so commonly found in our fellow-countrymen and so antiseptic to megalomania, may be a rudimentary form of what, at a higher and more reflective stage, would pass into religious reverence.

This is not merely fanciful and sentimental idealization of our own people. What is in question here is not a level of achievement but a standard of judgment. Always and everywhere the general mass of people fall far below their own standards, and for our immediate purpose it is enough if these are the qualities which men sincerely approve and admire when they meet them in others and which, in their hearts, they would like to be able to include in their picture of themselves.

*b) The negative case.*—The argument against the inclusion of any distinctively Christian ingredient among the basic values for which the British nation or the British universities stand to-day is powerful. As with the more ambitious claim for an all-out Christian university, the attack comes both from the secularist and from the Christian standpoint. The secularist will say to us something like this: "You exaggerate absurdly the

[25] G. B. Shaw, *Man and Superman*, Epistle Dedicatory (New York: Brentano's, 1907), p. xxxi.

amount of genuine, as opposed to nominal, Christianity, that is, of Christian modes of behaviour, feeling and thought, which survives in this country to-day. You are, almost wilfully, blind to the ever accelerating rate at which the tide of Christian belief is running out. It is reasonably certain that only a minority of the people to be met in the Strand or the Whitechapel Road have any effective religious belief or practice. But, if so, what warrant is there for assuming that they still take for granted any of the ethical implications of the Christian faith? Till lately, it may be, the Ten Commandments, or at any rate the last six, entered deeply into the popular imagination. But, decade by decade, that is becoming notably less true. From a Christian point of view must you not confess:

> Aetas parentum pejor avis tulit
> Nos nequiores, mox daturos
> Progeniem vitiosiorem?

We agree that, as a people, we have a faith, though it is inarticulate and unformulated; we fought for that faith in 1940. But what is agreed in it is not specially Christian; and what is specially Christian is not agreed. A Christian outlook and a Christian ethic are now sectional and not national."

When it is the university which is in question, the objector can argue *a fortiori*. It follows from the university's function as a place of thorough intellectual enquiry that it must be more sensitive to changes of belief and to contradictions, and less able to entertain simultaneously incompatible doctrines, than is the general community. Beliefs which may be treated as working assumptions outside the university must within it be freely canvassed and submitted to constant re-examination. Even if some degree of Christian belief may be taken for granted in the schools of the nation, it does not follow that it can be so taken in the universities. This is born out by experience. Representatives of the National Union of Teachers and of the Association of Education Committees can join with representatives of the Churches in framing an agreed syllabus of Christian teaching for the schools. But all who know them must admit it is unthinkable that the Association of University Teachers, or the National Union of Students, or the Senior Common Room or University Union or Guild of Undergraduates of any particular university, should voluntarily include in its "platform" an avowedly Christian element. But, if so, is it not unfair to take advantage of any Christian vestiges or vantage points in the university's constitution, to inveigle it into going where the majority plainly do not want to go?

The ascription of any sort of Christian character or purpose to the university in its corporate capacity is denounced no less vigorously from the Christian side in the name of Christian integrity. It is held to involve a disastrous element of pretence. The organization of the Churches, and especially of the Established Churches with their parochial system, has been based on the assumption that this is a Christian country and and that their main task is pastoral; and this assumption has now become a lie. There are a good number of decent people, at least in the upper and middle classes, having high principles with a Christian smattering, up to which they try, with fair success, to live. They form a healthy and honourable part of our community. But they are not Christians, though they are constantly mistaken for Christians both by others and by themselves. It is only the few to whom their Christianity is indeed a power of God unto salvation. These are now a small minority in a pagan country and theirs is a missionary task. The present, privileged status of the Churches in the national life is an organized hypocrisy, involving them in an atmosphere of continuous and soul-destroying make-believe. They need the bleak and bracing air of reality; in the universities, of all places, the pretence should be abandoned and not extended.

Further, dishonesty is, here as usual, the worst policy. The temper of the younger generation to-day is marked by "a distrust of every kind of *Schwärmerei* and an almost brutal honesty in the analysis of experience."[26] Many of the older generation, it is true, cling to long-standing moral and religious conventions. They

> keep hold of Nurse
> For fear of meeting something worse,

though with less than utter and unclouded personal conviction. But, to their juniors, such conventions, so sponsored, are contemptible and exasperating, and "the decent drapery of life" is relentlessly to be stripped off. Much of the missionary work of the Church will have to be done all over again in new, and more difficult, conditions. It cannot be done by bluff or

[26] Emmet, *op. cit.*, p. 221.

by adroit use of the force of inertia. For the gospel has to be presented not as "news" to those who hear of it for the first time, but as an old story to those who suppose that they have long ago seen through it. In the modern vernacular, they believe they have once already "been had for mugs," and they do not propose to repeat the experience.

As regards the university, Christians will be on firm ground so long as they claim freedom of action for Christian, as for other, groups within the university, which is itself neutral and uncommitted on the Christian-secularist issue. But if they claim the university itself for "Christianity," in however attenuated a sense of the word, will not their ground be weak and their morality dubious? They will only be playing a political game such as is imputed to the Communists. The same argument which caused us to reject the idea of a fully Christian university will hold good against any attempt to fasten on it a demi-semi-Christianity. The very conception of such a partial "Christianity" is itself heretical, since it implies that Christianity is a matter of more or less, when it is really a matter of all or nothing. It is not a water in which, if you please, you can dabble your toes; unless you plunge in out of your depth, you are not there at all. A "Christianity" attuned to the receptive capacity of the greatest number is a fraud masquerading under a false name. "What Jones will swallow" may have genuine moral value; and, so long as the Joneses are in a majority, it may afford the only possible basis for the university and for the co-operation of different groups within it. But things should be called by their right names, and the name of "Christain" should not be applied to what is really sub-Christian. The right model here is Grotius. When Christianity had ceased to be the working faith of "Christendom," he evolved a set of generally recognized principles, on the basis of which Christian and other states could combine. It is on something analogous to "Natural Law," rather than on the Christian gospel or on any derivative from it, that the university should to-day be based.

*c*) *An alternative diagnosis.*—Our present communal condition of mind is not simple but extremely complex. To depict it accurately and in due proportion is hard. It would certainly be false to represent the mind of the nation as still predominantly Christian, but neither is it clearly pagan or completely secularized. A penetrating diagnosis is contained in Mr. T. S. Eliot's *The Idea of a Christian Society*.[27] He starts with two propositions which are common ground to writers of different schools. On the one hand, much of our heritage is Christian. Our forefathers had a Christian map of the world. That is, their mental world-picture, or the frame-work within and with reference to which they saw particular events, was Christian. Their "culture," in Ortega's sense of the word, the body of convictions, conscious or unconscious, which underlay their moral judgments and by which they purported to direct their lives, was largely derived from the Bible. On the other hand the British nation is vastly less Christian than it used to be. It has undergone a drastic, and ever accelerating, process of secularization. The traditional order of life, as it existed for instance for the villagers of Gray's *Elegy* and for countless earlier and several later generations, has been disrupted. Church and churchyard have lost their pivotal position. "The bosom of his Father and his God" is no longer a simple and natural climax for the poet. For the common mind indeed "Nature" has silently displaced God as the ultimate basis to which all other things are referred.

But Mr. Eliot adds three further propositions which, if accepted, must radically modify the reasonable aim of the body of Christians, both in the nation and in the university. First, though the destructive process has already gone far and may go further, it is still incomplete. Our present state is transitional and not pagan or wholly secular; it differs widely from that prevailing in India or China or again in the Soviet Union. It is true that it cannot be long maintained; either the secularization will be completed or there will be a revivification of Christianity. But the issue is still open.

Secondly, "we have to-day a culture which is mainly negative, but which, so far as it is positive, is still Christian."[28] So far as there is a national conscience, it is still mainly Christian in colouring. With the majority of the people for whom the Christian picture has faded out, no alternative body of convictions, serving as an effective guide to existence, has yet taken its place.

[27] New York: Harcourt, Brace & Co., 1940. See also Professor John Baillie's Riddell Lectures, *What Is Christian Civilization?* (London: Oxford University Press, 1945).

[28] Eliot, *op. cit.*, p. 10.

There is only a vacuum; in practice they belong nowhere and give no whole-hearted allegiance to anything. "The religion of the Englishman," that is, the cause or causes for which, when roused, he is impelled to sacrifice everything, and even life itself if need be, is Christian in origin. In wartime it was often remarked that we were much surer of what we were fighting *against* than of what we were fighting *for*. But, when analysed, those values which we felt in our bones to be menaced by Hitler, and which Churchill incited us to defend, are what our nation first received as Christian values. It acquired them, not as self-subsistent truths, but as the consequence of certain beliefs about the nature of man and of the universe. The large number of our countrymen who sprang to their defence, but who have, individually, abandoned Christian worship and Christian belief, are putting their trust in a plant which has been severed from its roots, or as has often been said, they are living on their capital.

Thirdly, the issue cannot long remain open. Some of the factors producing the present precarious equilibrium are evanescent. The present residual Christianity will die out, so far as the public scene is concerned, unless it undergoes a revivification. "The choice before us is between the formation of a new Christian culture and the acceptance of a pagan one. Both involve radical changes."

Mr. Eliot's book was published in 1939, and, since then, events have moved swiftly towards a climax. In Europe, the war with its attendant atrocities, the overrunning of so many countries by the Nazi régime, and the resistance movements with their heroic and anarchic features, have combined to disturb rudely thick layers of convention and comfort which ordinarily conceal from men the reality of themselves and of the world. In this country we have experienced the imminent menace of annihilation, the awakening of 1940 bringing a renewed sense of mission, wide recognition abroad and a call to moral leadership, and the partial but still retrievable lapse since the end of hostilities. In the next twenty or thirty years, the future of the world may depend, and the future of the British Commonwealth almost certainly does depend, on whether we are able to stand for a way of life, as coherent and as wholeheartedly embraced as any other, but saner and more convincing. That remains to be seen. Our own belief is that it will depend on a recovery of our Christian heritage and its bold readaptation to contemporary facts. The burden of proof seems to rest on those who think it can be done otherwise.

What is the upshot? The British people to-day is not "Christian," except in a debased sense of the word which is therefore better avoided. But its imagination, its ethos and its sentiment, are, to a very substantial extent, *Christianized*. This is also true of the universities. The fully Christian faith cannot now, or in any near future, be the working basis of the British universities any more than of the nation. But it is not impossible or necessarily illegitimate that the pattern of their organization and studies, and the character of their corporate life, should be given deliberately a certain degree of consciously Christian orientation. It is not for the university, in its official capacity, to attempt the work of evangelization. The university cannot itself be the sower of the seed, though it can give him his opportunity. But it can, and should, provide a soil which will be favourable to growth and not so arid that the seed withers nor so full of thorns that it is choked.

But what is the moral? If the situation is as open as we have described it, have universities within the nation or Christians within the university nothing to do but to wait and see which way things will go? Are the determining factors wholly outside their control? Or is there any initiative which they can rightly and effectively take?

### VI. THE UPSHOT FOR THE UNIVERSITY

The British universities, we have agreed, are not sectional but communal institutions, and, in general, their basic assumptions must be those of the nation. In addition, as we have also seen, they pay allegiance to a number of fundamental, though unwritten, "rules of the guild," which are essential to the proper performance of their special function. Under each head we have enumerated some of these assumptions. At first sight they are not distinctively Christian; theocentric and other humanists, who attach a high value to personality, can unite on them. But, for us as Christians, both sets of values have deeper implications. They are not self-subsistent, but rest on a distinctive understanding of man and of the world, and in its absence they are precarious and "in the air." How far may we work to

stress these implications in the ordering of our corporate life and studies? How far can we ask others to acquiesce in our doing so? In the current vernacular, "where do we go from here?" We must soon go somewhere, for our present position is unstable and can only be transitional. "The impersonal configuration of our common life" will inevitably become a good deal less, or a good deal more, "Christianized" than it is at the moment.

There can be no moral leadership, of Western Europe or of the world, which is based on negotiations. It can only come from some group which knows its own mind and which has the courage of its convictions because they are firmly grounded in some coherent philosophy of life. At present every such group is a minority group. The question is, Which of them will prove itself to be the leaven which leavens the lump? Even if it should be the Christians, such "leavening" would not be a matter of evangelization or of the restoration of a "Christian university," in the sense in which for example the University of Paris in the Middle Ages was a Christian university—a supra-national, scientific centre of Christendom, whose basis of unity was at the highest point of personal life, doctrinal, theological and philosophical. It would be a matter of deepening the Christian colouring and bringing into consciousness the Christian background of the basic values on which the university is built.

Within a democratic community, what sort of leadership is practicable or wholesome? We shall agree in rejecting the régime of the drill-sergeant or the spell-binder. But we need not fall back on the leader with his "ear to the ground," whose sole aim is to find out what his followers want and to give it to them, who indeed inverts the rôles of leader and followers. Our clue must be Professor Toynbee's distinction between a *creative* and a *dominant* minority. With regard to the shaping of policy, the organization of studies, and the quality of corporate life, can the Christians within the university legitimately aspire to become such a "creative minority," whose lead others will follow?

What is the mark of a "creative" as distinct from a "dominant" minority? It puts forward opinions which are novel, in the sense that the majority of us did not previously know that we held them, or policies which we did not previously know we intended. Yet we did hold, or intend them, in that, when they are propounded, we recognize, accept and acclaim them. They come to us, not as strange and alien but as a revelation of the deepest truth of our own minds, though we could never have articulated them for ourselves. "Yes, that is what we think," we cry with a mixture of surprise and delighted recognition. They both light up what is familiar and show us that there is much "more to it" than we had realized. They are partly elicited from us and partly instilled into us. They explain us to ourselves. They represent our own real, but hitherto unconscious and ineffective, wills. May not the Christianizing of our common values bring, to university people generally, a similar sense of enlargement and enlightenment?

But here alarm may be taken. Is not this process, it may be asked, simply the hackneyed device of the salesman and the demagogue, of which Hitler was the supreme exponent? Is it not a technique for persuading people that they themselves have chosen what has been dexterously palmed off on them? And that is to add insult to injury; you not only manipulate people, but also bamboozle them. You are only proposing to "sell" Christian values to the university or the nation. But to criticize on these lines is to confound two widely different processes. The one puts to sleep our critical faculties and operates as a drug; it appeals to our baser urges, to inertia, greed and fear, to "envy, hatred and malice and all uncharitableness." The other appeals from Philip drunk to Philip sober. It eschews all methods that are clandestine and crooked. It evokes and energizes our highest capacities.

This can be made clear by two illustrations. The policy of Broadcasting House has differed sharply from that of Hollywood. Hollywood played down to its public. It gave the masses what they wanted—or what it supposed they wanted. It did little to raise, and a good deal to debase, the public taste. The B.B.C. also had to cater for an enormous clientèle and could not be merely highbrow. It had, in the main, to give its listeners what they liked rather than what the Governors thought good for them; in its early days the Third Programme would have been quite impossible. But it was always a little ahead of its public; it gave listeners the best that they would put up with rather than something a little below the average. So it gradually raised the whole level of public taste, and opened to millions new

ranges of aesthetic appreciation. This was genuinely emancipation rather than enslavement.

Another example is the contrast between Winston Churchill's (or Abraham Lincoln's) wartime leadership and the whole Hitlerian technique. His 1940 speeches gave his countrymen a moral lead which they could not have evolved for themselves. But he drew out their real mind and character and they responded from the depths of their being. In this there was no deception; he was not "putting anything over" on them or warping their nature. But he was able to evoke "the common enthusiasm which brings into action the deep energies of the crowd."[29] Even more relevant is Franklin Roosevelt's leadership of the American people in the years 1938–41. He saw earlier and more clearly than most of his fellow-countrymen the true nature of the issues in the struggle then developing. He led them by gradual stages into participation which in advance they would have repudiated but which they came to see was necessary to the maintenance of all they held dear. In a sense he knew their minds better than, at first, they did themselves, but he brought them to this knowledge. History will justify him as a democratic leader, insofar as he is held to have opened and not to have closed their eyes.

The application of this conception of leadership to the present task of Christians in the British nation (and by implication, in the British university) is made by Mr. Eliot in the work referred to above. To the three propositions we have already noticed, he adds a fourth which is the most momentous of all. Our choice, he says, is between the formation of a new Christian culture and the acceptance of a pagan one. "Both involve radical changes; but I believe the majority of us, if we could be faced immediately with all the changes which will only be accomplished in several generations, would prefer Christianity."[30] Obviously such a proposition admits neither of proof nor of disproof. But we see no warrant for ruling it out as improbable, and if it is admitted even as a possible hypothesis, the existence of established Churches in the national community or the conscious acknowledgment of Christian values by universities can be viewed in a new perspective.

How can this conception of the "creative minority" be applied to the practical problems of the university with which we are concerned? Can the British universities act in this capacity within the nation? Can they affirm, and ground themselves on, values not yet fully endorsed by the whole community, in the faith that the community will come to endorse them, when really confronted with them and when fully awake to the issues involved? So far as the special academic values are concerned, those embodied in the unwritten "rules of the guild," they can and they must do so. In this region they must lead, and not merely reflect, public opinion if they are not to betray their trust. But what of the more general "Christianized" values, of which we have spoken? Here, the universities could in principle give a lead; but, in practice, they cannot at present do so, since their internal divisions are too great. But this carries us back to the prior question, Can Christians act as a creative minority within the university?

Those who would answer, "Yes," are under fire from two sides. Secularists urge that, for Christians today to claim any special majority-rights or representative capacity, is at best an anachronism and at worst a dishonest "ramp." On the other hand, many ardent Christians contend that a claim by, or on behalf of, the mass of our countrymen to any sort of Christian status, is hypocritical and must debase the intellectual currency. But to both these attacks weighty replies can be made. The former is misconceived; for the real question is not whether Christians *may* but whether they *can* act as a creative minority. It is not their abstract right to do so but their spiritual and intellectual capacity that is in question. Christians, in the early centuries or in the modern mission-field, have won their triumphs by the degree of reality, the validity, which other people perceived in them and in their way of life, and the same principle holds good to-day. Whether they can do so again, is an open question which cannot be answered in advance, for the answer must be wrought out in life. In no university do they yet look like doing so; and any claim, in advance, to be looked on as a "creative minority" would be drowned in derisive laughter. Such a status has to be earned before it can be claimed. But that does not close the question. We may be called to tasks which far exceed our human resources. To our reading of history God has, not once nor twice but

[29] Maritain, *op. cit.*, p. 198.

[30] Eliot, *op. cit.*, p. 10.

many times, used the weak, foolish and base things of the world to confound the mighty and wise and noble, and the things that are not, to bring to naught the things that are.

But there is still the objection urged by some of the best of our fellow-Christians. They hold that the Christian minority could only become an operative influence on the university as a whole—or on the nation as a whole—by being "subdued to that it works in," that the same considerations, which are fatal to the project of a fully Christian university, apply equally to any attempt to write into its title-deeds some demi-semi-Christianity; and that, in the university as elsewhere, the policy of Constantine involves a concordat with the prince of this world. For strictly secular purposes, no doubt, Christians must often be prepared to work with half-believers and unbelievers, with whom they happen to agree on some immediate, practical, end. But, in such an enterprise, why drag in Christianity?

If the basic assumptions of the university are to have a Christian colouring at all, it is clear that, to-day, this cannot be the full gospel or anything closely approximating to it. In Maritain's phraseology, it will be "secularly and not consecrationally Christian." It will not, like the medieval ideal, aim at unity at the highest point of personal life. For example, to make sacramental observance a condition of full membership, in university as in commonwealth, could only result in the profanation of the sacrament. The "Christian" unity, so far as it exists at all, can only be a minimal unity; it is a unity not of faith and religion but rather of orientation. Yet it would be a mistake to drop the Christian reference altogether, and Christians should not advocate it. That would be to eradicate an element which is still present in the general consciousness, in however confused and embryonic a form, and which has the possibility of growth. The maxim, "All or nothing," represents one aspect, but only one, of the Christian attitude which has really a dual character going back to the New Testament. "He that is not with me is against me"; but "He that is not against us is for us," and the disciples are not to forbid others who cast out devils in Christ's name though the status of their discipleship may be dubious. Over and over again in the Parables, instances of natural goodness and piety are treated as signs and tokens of genuine discipleship. Christians belonging to Churches which practise infant baptism cannot repudiate all communal propaedeutics to Christianity simply because they operate at a sub-personal level. Nurture in a Christian family is a great boon; the "Freshman" of whom it was said, "An atmosphere of holiness, not yet completely his own, hung about him," was highly privileged. No doubt, the contemporary university cannot, like a Christian family, provide an atmosphere of "holiness." But it could provide a soil which is favourable to Christian thinking and living instead of, as at present, one which is resistant.[31]

### VII. CONCLUSION

If our universities are to rise to the height of the times, the first, and quite inescapable, requirement is that they shall concentrate far more attention on the deep and difficult issues of the day. There must be no more tacit conspiracy of silence. Convictions must be explored and tested to their roots. Next, communications must be re-opened. Contact must be made and the issue must be joined, not at the ordinary level of debate, but at the level at which convictions are really formed. If, at this level, agreement on a basic philosophy of life were possible, that would invigorate the whole work of the universities and their contribution to the world; but nothing like a modern "Summa" is conceivable for a long time to come. Yet, though unformulated and unsystematic, the acceptance of some basic values is implied in the normal life-attitudes of British university teachers and students as of the British people generally, and there are others more special to the university; and for practical purposes these can be regarded as axiomatic.

So much very many critics would be willing to concede. "But," they will ask, "why cannot you stop at that?" We agree in commending certain virtues and in condemning certain vices; and, on that basis, we can work in harmony on practical issues which come up for decision in Faculty, Senate or Council. We do not agree, and are not likely to agree, on ultimate questions. Why then force to the front questions which must divide us? This is a time of transition. The ground is still heaving, the day for permanent building is not yet. In

[31] See Sir Walter Moberly, "Some Causes of Our Present Discontent," reprinted in *Journal of General Education*, III, No. 3 (April, 1949), 163–74.

intellectual, as in physical, construction we must still "make do" with temporary expedients.

Such an attitude might be reasonable in less desperate times. But "safety first," to let well enough alone, *quieta non movere*, to wait for the secular movement of thought to come to a natural climax, is no missionary policy for Great Britain in the world to-day, or for the universities in Great Britain. It may sound plausible in our own pleasant, and seldom war-scarred, Common Rooms; it would be much less so in the universities of Central Europe. If we are to "withstand in the evil day, and, having done all, to stand," there must be no gaps and no weakness in our armour. The "truth" with which we "gird our loins" must be comprehensive and thoroughly grounded. Otherwise we shall succumb to strange gospels which are more coherent and more firmly held than our own. Whatever our basic values are, national and academic, we need to make them much clearer and to develop and deepen them, if we are to play the rôle in the world to which we were called in 1940, and to which leaders as far apart as Winston Churchill and Sir Stafford Cripps would agree that we are called to-day.

In these basic values there is certainly a Christian ingredient. No doubt it is extremely hard to estimate its present extent and significance. Equally honest observers may well differ widely in their estimates; and even among our own group there is at least some nuance of difference. Christian teachers should not ask their colleagues to accept in advance any wider commitment of the university to a Christianized orientation than those colleagues are disposed to concede. But they should claim elbow-room to show themselves a "creative minority," if they can. All will then depend on whether they have enough spiritual energy and political wisdom to demonstrate to others that a growing Christianization of "the impersonal configuration of our common life" is what sound reason and the common good require.[32] Yet in their own minds, they will be well aware that they can only hope to have such energy and wisdom if they open themselves in extraordinary measure to be vehicles of the grace of God.

Some of the lines on which such a policy may be worked out in practice will be considered in . . . [other chapters of *The Crisis of the University*]. What is possible and legitimate varies from university to university. But for Christian teachers and students everywhere, if we have ears to hear, there is sounding, through the course of events, a trumpet-call for action. Almost audibly, the voice of the Lord is heard, saying, "Whom shall I send and who will go for us?"

[32] Cf. Maritain, *op. cit.*, p. 168.

# *The Nature and Teaching of the Humanities*

RICHARD McKEON*

## I. THE HUMANITIES IN THE PRESENT AGE

THE PROBLEMS which arise in education in any age and relative to any subject matter or pursuit are determined in part by the problems of the times and in part by the knowledge available. The program to equip a student for life depends on the life for which he is to be equipped and on the instruments by which he may be equipped for such a life. The circumstances and the sciences can be stated concretely for any time and according to any theory; but "concrete" and "abstract" may interchange, since the interpretation of times depends on theories which evolve and decline, and the development of theories depends on characteristics of time which are susceptible of various and often opposed interpretations.

The recurrent criticism of educational practices—in antiquity, during the Middle Ages, in the Renaissance, and at various stages of the development of modern society and the advancement of modern science—is that education has ceased to be relevant to life and that it has failed to make adequate use of knowledge newly available. The adjustments of education in the face of these criticisms and as a result of the disputes that accompany them are less uniform and obvious. There is little disposition to argue in retrospect against Cicero's conviction that the Romans could not afford to neglect the arts of the Greeks, or Alcuin's effort to adapt the liberal arts to the life of the Carolingian court, or John of Salisbury's broadening of the bearing of culture on politics, or Thomas Aquinas' adjustment of the corpus of Aristotelian science to the Christian conception of values, or Valla's or Vives' readjustment of the liberal arts by appeal to Greek philology, rhetoric, and literature, or Hobbes's or Shelley's or Playfair's complaint that the universities had neglected science. The appeal to history in discussions of education, however, usually comes to a stop in the complacent supposition that what is now presented as the dominant solution of any period was somehow suited to the needs of that period. Modern education must seek a solution different in all respects except that it similarly provide an adjustment to different modern needs. The appeal to theory usually reduces to the choice between sides in a great dispute, which has run the whole history of the discussion of education, concerning the nature of man and his environment and concerning the nature of knowledge and the arts.

So far as history is concerned, it is obvious that the circumstances of man have undergone radical changes and that the knowledge of man is vaster than, and different in character from, earlier expectations and dreams; but it is also obvious that the fundamental nature of man, the values that he seeks, and the conditions of truth that determine all deliberate planning are unchanged and that the great achievements of the past are examples and guides for the present and the future. So far as principles are concerned, the complex development of experiment and dispute is at least clear enough to leave no doubt that arguments in favor of doctrines or practices advanced on grounds of novelty suited to new conditions (in which false distinctions between classes of men, faculties of mind, theory and practice, thinker and subject, have disappeared) are no more recent or conclusive than arguments advanced on grounds of tradition suited to fundamental principles of human nature and morals (in which reliance is put

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on reason, human achievement, and the unchanging regularities disclosed in science).

We are still involved in the opposition of two dogmatisms, which emerged first in western thought when the subtle distinctions used by Socrates against the Sophists were reduced to doctrinaire grounds for general educational practice. They have reappeared to solidify new distinctions whenever differences have been sought in later efforts to combat old dogmatisms. Any theory or program of education must take into account both the nature of man and his circumstances and also the nature of knowledge and its inculcation. But it is also possible to transform a theory of man and society into a dogma of the mode of acquisition of knowledge—or whatever is acquired in the place of knowledge—uniquely adapted to psychological needs and interests or social structures and tensions. Nor is it difficult to oppose an education centered on individuals or groups by transforming a theory of the method and organization of knowledge into a dogma of the potentialities of man and the future of society.

Both dogmas depend on conceptions of human nature and knowledge. From the oppositions of these conceptions come endless and ambiguous debates, such as those which oppose education as a training for the "whole man" to education as an intellectual discipline, and arguments as circular as those in which the effort to distinguish theoretic from practical questions is opposed to movements which unify theory and practice, science and art. These are recurrent forms of the dispute in education. They do not state real issues in the sense that either side has ever, in the long history of various forms which the altercation has taken, recognized or accepted the doctrine criticized by its opponents. No theory of education professes to educate less than the "whole man"—or to educate him in respects in which he is not educable; and none professes to neglect the bearing of education on man's social functions and responsibilities—or to limit its ideals to what is, in fact, actual in the social situation. Yet these oppositions recur, not because the opposed positions are accurate statements of opposed theories, but because they do reflect, on the one hand, genuine theoretic and philosophic issues, and they do have consequences in educational practice and social relations.

The humanities are, more than any other field of study and teaching, inextricably involved in this clash of dogmatisms. Inasmuch as they derive their name and meaning from the "human," the case for including any subject matter under the scope of the humanities must depend on its potential contribution to human ideals and its apparent affinity to human values. On the other hand, the traits of what is "human" are found and studied in the great works of men. These constitute the subject matter of the humanities, and therefore any conception of human nature or human aspiration must be defined, in so far as it is related to the "humanities," by external manifestations in arts and knowledge and human achievements. The humanities signify both a subject matter and an attitude; yet it is impossible to define them unambiguously by either means. Even great works of art have not been put to humanistic uses in all the employments which they have found in education and communication, and the profession of human ideals in doctrinaire "humanisms" may serve as cloaks of interest or dogma and as instruments of controversy without positive educational or cultural content.

The terms of the controversy—the fundamental emphasis on what is human and the study of what is human in the works of man—turn the search for a definition of the humanities either to the discussion of basic principles of nature and human nature or to the examination of consequences of human action and human relations. The humanities take their specific character from the uses of the arts in any period, and they can be identified for the time in those uses. But, in spite of the simplifications to which cultural historians are prone, no age has succeeded in achieving agreement on one philosophy of human nature. A common development of humanistic studies, or complementary programs, may be supported and justified by divergent philosophies; but not all forms of the philosophies called "humanism" yield insight into the human arts or techniques for their analysis and use, and the future of the humanities is not bound with the success of any humanism. In general, appeal to principles in the oppositions of educational dogmatisms is ineffective, since the philosophic oppositions are themselves unresolved; but the consequences which follow from the educational theory in practice serve to define both the educational theory and the underlying philosophy. Moreover, situations which emphasize the need of common action

based on divergent philosophic principles are among the characteristic marks of our times; the examination of the problems faced by education and by the humanities should leave open the possibility of a common solution grounded on different reasons in the philosophies of a tolerant and intelligent world community.

The place which the humanities might occupy in the education and the action of the present age can be recognized from the analogy of other ages in which they were prominently developed and successfully used. The term *humanitas* was invented by the Romans to signify not merely the arts which they learned from the Greeks but the result of the impact of Greek arts on Roman life. There are two dimensions in the Latin definition of the term: (*a*) the historical and erudite, since the arts are learned from books and from the history of past achievement, and (*b*) the actual and practical, since their cultivation and use is a characteristic of man and the period. The meaning of the word is summed up in the second century A.D. by Aulus Gellius, who protests that "humanity" is not, as is commonly supposed, a translation of the Greek word *philanthropia*, and it does not mean promiscuous benevolence toward all men; it is more nearly a translation of the Greek word *paideia*, and it means "erudition and instruction in the good arts." Such arts and sciences are the peculiar possession of man alone among animals, and they are acquired from books and history by anyone who is in the least degree more human—*paulo modo humanior*.[1] The rebirth of the humanities in the Renaissance showed the same pair of characteristics: an enthusiasm for Greek and Latin letters and the use of learning as an integral part in the formation of a new culture and civilization. The study of Cicero and Plato, and even the re-examination of Aristotle, were joined inseparably in the sixteenth century to a new way of life. Once this characteristic conjunction of art and civilization is isolated, the marks of "renaissance" in other periods are easy to recognize: the use of Martianus Capella and the rhetoricians in the Carolingian Renaissance; the use of Cicero, Ovid, and Boethius in the twelfth century; the translation of Aristotle and the use of the body of science accumulated in his work in the formation of a new philosophy suited to the problems of the thirteenth century; the contribution of Cicero and Virgil to the rationalism of the Enlightenment.[2]

The arts employed in past instances of the development of the humanities and the social circumstances of their employment are widely diverse. The temptation is to argue in simple terms of difference or identity—that the differences of times are so great that what once worked well would be an impediment to progress in other circumstances and therefore that a "new method" must be devised appropriate to the problems of the present age, or else that the neglect of the arts is the cause of the unresolved problems of the present and therefore that a return must be advocated to sources of inspiration that were effective in a preferred renaissance. Yet the humanistic aspects of cultures and the humanistic problems presented by the relations of men in our times are much more easily apparent than either the underlying conditions that are invoked to explain them or the methods and arts that are advocated to treat and resolve them. The advance of technologies, the revolution in means of mass communication, the clash of programs for the improvement of the condition of man, and the multiplication and extension of relations among men have brought cultures into contact and have broken cultural and political bonds, have deepened attachments to cultures where they were previously unsuspected and have dissolved ancient loyalties and affinities, and have provided means of understanding other peoples and instruments of propaganda against them in cultural traditions which may stimulate appreciation of divergent values or suspicion of intrusive alien ways.

The dimensions of the humanistic problem of the present age begin to emerge when one examines the new cultural relations and the newly available means by which they may be treated. In past periods of humanistic efflorescence a new learning based on old achievements was brought to bear on contemporary problems: there resulted in that application a conflict between the tradition established at the time and the revolutionary tendencies based on an older tradition. Today many cultures are engaged in a struggle to con-

[1] *Noctes Atticae* xiii. 16.

[2] Richard McKeon, "Renaissance and Method in Philosophy," *Studies in the History of Ideas*, ed. Department of Philosophy, Columbia University (New York, 1935), pp. 37–114.

tinue or re-establish values which they claim as their peculiar possession and heritage; and a new learning is emerging in which science and technology are employed as instruments for the preservation of cultures but, in the process, undergo opposed cultural and philosophic interpretations: the conflict is between cultures, between ideologies, between ideals of life, and between methods of political organization and government.

In the first place, the appeal to one tradition is superseded by appeal to a multiplicity of traditions. The Western Tradition or the Civilization of Western Europe has taken its place in a context of world civilization and world cultures, and even the homogeneity which it preserved through various phases has been differentiated into contemporary parts which reflect different historical stages. Oriental cultures, which influenced the West in past periods, are now not influences but part of a contexture of world civilization. Latin America, North America, and eastern Europe share a common tradition with western Europe in arts, philosophy, and science, but they have arrived at different stages or have developed different strains of that tradition, which have no direct communication but compound ambiguity and conflict by their similarities. This is not a problem to be solved by reduction to a least common denominator. The sound conviction that the truth is single and the persistent sense that what is familiar is right are found in conflict with the conviction that the peculiar values of human expression and aspiration are closely related to their cultural sources and with the fear of cultural imperialism which results when cultures spread because of economic or political power rather than because of intrinsic value.

In the second place, ideas and the formulation of ideas have assumed a new prominence in the discussion of the problems of the world today. The multiplicity of cultures may either be the foundation of a coherent world civilization and world community, constituted by the interrelations of mutually consistent values and ideas, or it may determine the pattern of ideological conflicts in which not only technologies but science itself, as well as art, literature, philosophy, and religion, are interpreted and guided according to considerations of social significance and political opportunity. The opposition of ideologies is an opposition not only of ideas but of modes of formulating and grounding them and of conditions of statement and action in accordance with them.

In the third place, the defense of values and the tolerance of differences of belief and purpose have assumed new complexities. The multiplicity of cultures and the conflict of ideologies may be adjusted by understanding of differences and by co-operation in the achievement of common or mutually consistent ends, or it may be a sign of the basic opposition of inconsistent ways of life. Only analysis and understanding can determine which is the case in any particular instance or problem; but the assumption prior to inquiry that a difference is, in fact, a fundamental opposition leads to a program of suppressing, rather than discussing, differences. A new anti-intellectualism is gaining strength today which cuts short the difficulties of examining doctrines, purposes, or programs of action to ban parties or liquidate classes, to make association with suspect groups an excuse to suspect whatever position is taken, and to defend a way of life or a program of action against opposition by force.

In the fourth place, there has been an increasing recognition of the uses to which intellectual and cultural instruments might be put in the solution of political and social problems; and there are numerous examples, among which UNESCO is outstanding, of international efforts to prepare international understanding or to use cultural means to establish the minimum of world community essential to the survival of civilization. Mutual intelligiblity is essential to common action, and political institutions devised to further understanding and communication must either learn new political arts or become themselves instruments of power politics.

The world is torn today by many conflicts. It may be disputed whether they are fundamentally conflicts of cultures, of ideologies, of ideals, or of power structures. A significant development of the humanities, as opposed to their use for propaganda or their preservation as pedantic survivals, must be relevant to those conflicts, however interpreted, as past revivals of the arts were adapted to the solution of past problems. One of the problems of the humanities is the study of the humanistic aspects and expressions of the numerous cultures of the world. Man does not live by bread or by politics alone, and the understanding of the life of a people

derived from attention to their family structure, their modes and relations of economic production, and their tensions is incomplete without knowledge of the ideal content of their arts, their philosophy, their sciences, and their religion. A second problem of the humanities is to examine the meaning and grounds of the arguments which seem to unite and to divide men. Any term, however basic, may be ambiguous in use, and any argument, however well formulated, may be misused for propaganda purposes; but the complexity of the problems stated in oppositions of ideologies is no ground for concluding that ideological problems are unreal, and they are not avoided or solved by reducing them to economic tensions or immoral motives. A third problem of the humanities is to isolate the structures of values and the criteria pertinent to arts and actions. The multiplicity of cultures may be a means of enriching the lives of men without danger of relativism, and the common ends of men united in a single world community may facilitate the determination and clarification of values without danger of reduction to a single authoritatively imposed system. A fourth problem of the humanities is to discover the means to make the humanities more widely effective in their social manifestations and their political uses. There is danger of reducing arts and sciences and philosophy to propaganda if utility and application are substituted for criteria proper to these disciplines; but the arts of thought and expression are also effective instruments to move and instruct mankind and to form the great communities which find their expression in great art and in advancement of knowledge and the values of life.

### II. THE NATURE OF THE HUMANITIES

The ingredients of contemporary culture which define the problem of the humanities serve to emphasize the difficulty of determining the arts suited to situations so novel and complex. The humanities may be defined in a variety of ways which avoid these complexities, but at the expense of ambiguities even more stultifying.

Definitions of the humanities in terms of subject matter usually identify them with literature, art, music, history, philosophy, or some selected portion of these subject matters or some aspect of them. Such definitions fall into two errors: (*a*) they fail to isolate the specific property which characterizes the humanities as such, since any product of the arts may properly be interpreted in nonhumanistic fashions, and, at the same time, (*b*) they fail to determine the differentia which distinguishes the humanities from other subject matters, since no such enumeration exhausts the subject matters susceptible of humanistic treatment. Such definitions tend, therefore, to be supplemented by specifying the uses in which subject matters have an aesthetic dimension. This is the practical reduction of the humanities to the uses which they, in common with other human activities, subserve.

Definitions of the humanities in terms of attitude or method usually identify them with some approach to knowledge or some branch of knowledge, such as linguistic science, criticism, disciplinary or cultural history, analysis of ideas, or some combination of these methods or some selection from them. Such definitions fall into errors: (*a*) they tend toward doctrinaire commitment to one method or attitude and polemical opposition to all others, and yet (*b*) that method is seldom either clear enough to be determined unambiguously or broad enough to fit the humanities without first cutting them to its specifications. These defects are supplemented, therefore, by deriving the linguistic, critical, historical, or analytic method from some more fundamental dialectic or from some scientific method. This is the theoretic reduction of the humanities to elements and forces by which they, in common with other human activities, are determined. The search for a definition is rendered more complex, moreover, by the fact that theoretic is sometimes reduced to practical and that in the hierarchies of the sciences it is sometimes recognized, as in Auguste Comte's *Système de politique positive*, that a good case can be made for more than one basic science.

The difficulty of identifying the attitude, the subject matter, and the knowledge characteristic of the humanities is shared by other fields of inquiry and teaching. It is disguised in contemporary discussion by assimilating the problem of method and inquiry to the old metaphysical problem of first principles and the unity of the sciences. Knowledge may be made one, but it is not likely that the unity will be achieved by reducing all significant problems to a single subject matter and making susceptibility to such reduction the

test of significance or by seeking a method which is universally applicable to all problems and making the general description of problems the definition of method. The metaphysical problem is ultimately important, but the problems of general education and of the humanities in general education can be stated without premature commitment to a metaphysical position. It is possible, even, that a better general education might improve the discussion of the organization and the methods of the sciences.

Education proceeds by means of statements and operations, and the problems to which the statements and operations employed in education are directed may be used to determine both the methods and the arts suited to resolve the problems and the subject matters involved in the resolutions. If education is approached in terms of methods or arts adapted to the solution of problems, it is apparent that methods are not uniquely adapted to things but that any subject matter is susceptible of treatment in a variety of ways and according to a variety of methods. If the humanities are treated as arts adapted to the solution of problems, it is possible to determine the attitude, subject matter, and knowledge which characterize them and also the dangers to education in general of reducing the humanities practically to other uses or theoretically to other subject matters. So conceived, education is concerned properly with three sets of arts adapted to three kinds of problems. These may be used to identify subject matters of education.

The subject matter of education is found in the processes of things and natures when statements and operations are considered with respect to their adequacy to what they seek to express or control. The place of the natural sciences in general education is determined by the arts and skills required to analyze problems, validate knowledge, and formulate or understand statements about natures and things. The subject matter of education is found in the relations of men when statements and operations are considered with respect to their effectiveness and consequences. The place of the social sciences in general education is determined by the arts and skills required to analyze problems, validate knowledge, and formulate or understand statements about associations, communities, and institutions set up by men to achieve common values. The subject matter of education is found in the great achievements and products of man when statements and operations are considered with respect to the form or structure of their use of means and organization of parts. The place of the humanities in general education is determined by the arts and skills required to analyze problems, validate knowledge, and formulate or understand statements about the appreciation and use of the great achievements of man.

All these arts are applicable to all subject matter, for a subject matter is accessible for understanding only in statements of problem and proof or in the operations of inquiry and experiment. Thus any great work of science—say, Euclid's *Elements*, Newton's *Principia*, or Darwin's *Origin of Species*—is subject to scientific, social, and humanistic analysis. It may be treated in terms of the techniques by which statements and hypotheses are tested and validated relative to the subject matter to which they were applied and the problems they were designed to solve. These are the techniques which bring the student into testable contact with things: it is sometimes desirable to study these techniques in their original statement when the first formulation of the problem presents it in broader scope, clearer intelligibility and subtler demonstration; but in other cases, when later advances in science have modified the original statement of the problem or formulation of the solution, teaching should concentrate on current techniques of inquiry, experiment, and proof. The same work may also be treated with reference to social circumstances which determined the problem in its origins or conditioned its solution, or it may be treated with reference to its significance and effects in its social context. Current inquiries into the social consequences of scientific advances have profound importance not only in their possible applications to the communities of men but also in their possible effects on the continued progress of science. The same work, finally, may be considered as the expression of a man. The fashion in which the problem is formulated and the choice of criteria, no less than the structure of the work and the organization and development of exposition of data and proof of the conclusions, are discovered by arts of analysis applied to other considerations than the nature of things or contemporary social and cultural conditions. The history of science may be a source of knowl-

edge about the nature of things achieved by scientific method or of knowledge about conditions and values of cultures and times; but it has, until recently, been practiced less for these two purposes than as a humanistic discipline designed to yield insight into man's aspirations and expressions, largely erroneous as science and largely in advance of contemporary cultural patterns.

In much the same fashion, a great work of literature, like *Oedipus rex*, the *De rerum natura*, the *Divine Comedy*, or the *Brothers Karamazov*, is subject to scientific, social, and humanistic analysis. It may be analyzed as a statement of truth concerning a subject matter and as a source of knowledge concerning the operations of nature or, more frequently, of the human mind and the subconscious, as when Freud analyzes art and literary expressions. It may be a source of information concerning a community or a time or a culture, as when works of art are treated in anthropology and sociology. Finally, it may be analyzed as a work of art to bring to attention the qualities that must be observed if it is to be considered a work of art and not merely a stimulus for random impressions or a source of information about its subject or its circumstances. Nor is it less difficult to see how the formulation of a theory of human relations or of the laws or institutions to regulate them, the *Politics* of Aristotle, the *Institutes* of Justinian, the *Decretum* of Gratian, or the *Commentaries* of Blackstone, can be examined for the scientific principles on which they depend and the scientific method which they employ, for the marks of political and cultural influence they bear and the political and cultural significance they have, and for their structure of organization, manner of development, and mode of expression.

Not only does the distinction of these arts serve to differentiate functionally the provinces of the natural sciences, the social sciences, and the humanities, but it also throws light on controversial issues which the student will have to face, including controversies concerning the nature and methods of education. Most of the problems involved in wide controversy are treated *ad hoc* and by dogmatic commitment to one side or the other. Such treatment, as is abundantly evident in current discussion of ideological conflicts and freedom of thought and expression, has the disadvantage of degenerating into double talk with respect to objectives and into self-contradiction with respect to means of achieving the objectives. Ideological conflicts have obvious applications to the objectives and methods of science, as in the application of communistic interpretations of Marx to the physical and biological sciences. Yet little advantage has been taken of the opportunity which freedom of inquiry permits to demonstrate the specific errors of doctrines like Lysenko's or to determine the ideological form of effective opposition to political or economic control of methods and doctrines. Ideological conflicts have obvious bearings on the social, political, and economic situations in which they originate and on the tensions which they reflect; and the application of the social sciences to the study of ideologies should yield knowledge of group relations, understanding of grounds of difference, and means of translating tensions into forms conducive to progress rather than conflict. Ideological conflicts, finally, are expressed in symbols and arguments whose forms, grounds of effectiveness, and refutations can be analyzed. The three inquiries should supplement and support one another. The examination of the grounds of the truth alleged in a statement is necessary to differentiate science from ideology, for even true statements may be asserted for reasons irrelevant to their truth. The examination of the social grounds of a conflict is necessary to differentiate justice from power, for even a false position stated in the conflict may have real grounds and motivation in an inequity to which it is addressed. The examination of the forms of argument is necessary to differentiate good propaganda from bad, for the strategy of truth may fail and victory is not necessarily the sign of the better argument.

General education is unified when these three sets of arts supplement one another in the treatment of related problems. It is not unified by discovery of a universal method or a common subject matter. The treatment of the humanities is a symptom of the differences that result from these different forms of unification. The humanities are characterized by their pertinence to what is human; but, if the human is defined by going to biology or psychology or sociology for a definition of "man" or a determination of his characteristics, what is specifically humanistic disappears. "Human nature" as it is manifested in the arts and in human expressions is not reducible to its psychosomatic grounds or social manifestations. The basic error of Dewey and Rich-

ards in their treatment of art and literature is not that biology or physiology is irrelevant to poetry but that the significant statements that can be made about poetry on the basis of man's animal nature or his nervous system or his social adjustments do not go much beyond the recognition that poetry is an emotional use of language, that meanings and values are relative to their contexts, and that experience no less than the object experienced is essential to the consideration of art. A similar error has vitiated a great deal of inquiry and instruction in the social sciences, where appeal to a biological or psychological definition of human nature is sometimes used to simplify the complexities of social relations. "Human nature" is defined in its manifestations in social action and association in respects which are not reducible to psychosomatic factors, and biology and psychology are supplements to, not substitutes for, such knowledge of man.

The humanities are characterized in like fashion by a subject matter found in the cultures of peoples and ages, but "culture" has as many dimensions as "human nature," and the limitation of its meaning to superpersonal relations and social patterns is as stultifying as the limitation of human nature to psychosomatic indices or operations. Human nature has social and humanistic dimensions which give significance to inquiry and teaching in the social sciences and the humanities, and culture has natural and humanistic dimensions. The physical and organic factors which delimit cultural development are not suited to supply the explanation of cultural values,[3] and the values which are useful as means by which to apprehend the characteristics of cultures are the materials rather than the means for determining what constitutes value. The use to which distinctions borrowed from art forms or artistic expressions—from Greek myth, Christian religion, poetic meditation, or dramatic plot—have been put in the development of psychological and social theories is an indication of an interdependence among the techniques of the natural sciences, the social sciences, and the humanities, not of a hierarchy or unity of techniques. Man's most considered and refined expressions are realizations of material and organic potentialities and exemplifications of social influences and configurations, but potentialities and contexts can be studied only in the actualizations in which they are realized and in the foci in which they are exemplified.

The effort to extend the methods which have proved effective in the natural sciences to social and humanistic problems and to provide better formulation and analysis for these problems encounters the difficulty that only those portions of problems remain for consideration which are pertinent to the method. Humanistic problems disappear under the operation of "fundamental" and "universal" methods which have been borrowed from the sciences, and the objects of art and contemplation emerge only as parts of other problems and only in forms that are relevant to their solution.

The practical reduction, in which all problems are treated by methods suited to the resolution of practical problems, takes two opposed forms which have the same practical effect. According to Soviet criticism, aesthetic considerations, like legal, political, religious, and philosophic ideas, are merely ideological forms in which men become conscious of the conflict of classes. The development of literature can be explained by the material transformations of the economic conditions of production, but literature affords no accurate or scientific information concerning the conditions from which it derived its origin. On the other hand, it does play an important role in affecting the life and history of society, and, like science and law, it is therefore properly controlled by political means and directed toward social ends. The reaction to this form of practical reduction has been not a contrary theory but a practical reduction which operates in reverse direction. Communist ideas, in whatever field they are expressed, are dangerous to, and subversive of, liberal political, social, and economic institutions. But they can be recognized only by the fact that members of the Communist party and fellow-travelers entertain them, and lists of persons and organizations are therefore prepared in order that these ideas may be marked and discredited without the pain of examination. In this second form of authoritarianism, doctrines are controlled by scrutinizing the background and associations of their proponents, by finding large analogies between any form of planning and communism and between any form of free enterprise and liberalism, and by inhibiting the exploration of new ideas by the suspicion of contamination with

[3] Cf. A. L. Kroeber, "The Concept of Culture in Science," *Journal of General Education*, III, No. 3 (April, 1949), 187, 190.

alien influence which attaches to the novel. In this practical reduction the arts and letters, philosophy, and history are important only as they fall under the same analogy and association with no special mark, except as they are found to offend against morality in some centers, like Boston and Chicago, or against decency in some industries, like the motion pictures and the radio.

The effort to give the humanities content and relevance to life by placing them in a context encounters the difficulty that the subject matter is transformed in the process of the reduction. The theoretic reduction of what men have made and said to forms that can be explained by linguistics or semantics or history or sociology or physiology or psychology may make art and philosophy relevant to life as defined in the terms of those analyses but at the expense of negating any criteria proper to art or philosophy. The new forms of anti-intellectualism and relativism in American life result from the discovery that values which are identified only by the fact that they are the values esteemed and expressed cannot be discussed in other terms than that they are, in fact, esteemed and expressed. Or, if poetry is a use of language, one may at most look for the expression of emotion or the use of metaphors and ambiguities in poetry. Courses in the humanities conceived in this reduction depend on the selection of works and problems by their relevance to "current issues" or "human relations" or "modes of expression" or "political institutions" or "American culture." Works of philosophy, art, and history have relevance to these problems, but it is a mistake to suppose that treating them in this context is either a contribution to the study of the humanities or a rediscovery of art as a part of life. Rather the arts become semantic or psychological or social data, and the omission of criteria in the restitution of art to life has the effect of establishing a new separation of art from life. Concern with literature in the new guidance given to students in educational institutions is viewed as a substitute for life for which pathological reasons can be found, and excessive concern with erudition has become evidence of fleeing from life.

Authoritarianism and relativism are inconsistent with a progressive civilization and a good life. The robust cultures of the past were actively concerned with the removal of barriers to novel and even heretical ideas. They were not lacking in criteria by which to judge the arguments and the works of men and to combat presumptions applied to them a priori. The tendency to authoritarianism and relativism can be reversed only if the good can be separated from the bad in what men have said and done. Fortunately, the criteria are not far to seek: as in the case of past cultures which have applied the arts to the solution of their own problems, the great achievements of men in other times and in other cultures supply the standards. These are the proper study of the humanities. Humanistic studies are not in themselves sufficient to effect this reversal, but the place of humanistic studies in a program of general education is a reliable sign of the probable effectiveness of the program for this purpose. For education in the humanities should serve to open the mind of the student to the standards of what man has achieved and give him the skills requisite to isolate, judge, and appreciate values.

### III. THE ARTS OF THE HUMANITIES

This conception of the nature of the humanities, its subject matter, and method concentrates attention on the arts essential to humanistic studies and on the objectives of education in the humanities. The subject matter of the humanities is the great works of men in sciences, in institutions, in arts. The methods of the humanities must be adapted to the characteristics of those works as expressions of the human spirit, and the contribution of the humanities to the life of the individual and the community is found in the uses made in those works of linguistic, aesthetic, historical, and intellectual devices. Theories of the nature of the humanities and their manner of operation will be expressed in a variety of philosophies and sciences, and no uniformity will be found in the judgments of different experts or of different ages. But the arts of the humanities do not depend on agreement concerning the nature of the humanities and need not lead to unanimity in the judgment of the works of man. At most they should lead to intelligible discussions of the grounds and reasons of judgment, and they should clarify the interrelations of the intellectual and philosophic hypotheses on which they depend. Education in the humanities, in turn, should be a preparation for analysis, discussion, and choice, ultimately including decisions concerning systems of value and criticism; it should not be the exhibition of objects without critical concern for the values which they em-

body or reflect nor the inculcation of a system of values without concern for its applications or embodiments. The arts of the humanities, so conceived, may be described relative to three broad, interrelated objectives to which they may be directed.

The foundation, as well as the end, of the arts of the humanities is *appreciation*. Acquaintance, interest, and taste are the motivation for cultivating the humanities and the objective toward which their cultivation is directed. A broad acquaintance with the history of the arts, the sciences, philosophy, and the development of human communities is a basis for interest; and intelligent interest is the only stimulus to seek further acquaintance. Taste is developed in the course of experience in the arts, and taste is a guide to further experiences. The study of the humanities is self-corrective in respect to the distortions of the two reductions to which they are subject, provided that the student is permitted to study the actual works in almost any fashion. Acquaintance with and appreciation of the great achievements of thought and expression are ends in themselves, and, whatever the uses to which the products of the arts are put in the practical reduction of the humanities, the qualities of great thought and expression will become apparent to sensitive minds. Ultimately, great art is more effective in practice than propaganda is, since it prepares a great public and not merely a temporary and haphazard attitude of mind. Similarly, standards of value emerge as experience among the arts is increased; and, whatever the subject matters with which the products of the arts are identified in the theoretic reduction of the humanities, the effort to account for the effective expression and communication of feelings and values encounters problems which cannot be solved by treating expression as whatever is intelligible or value as whatever is an object of interest and desire. Great art and great philosophy are symptoms of a healthy and vigorous culture; whether the purpose is to study the culture or the art, the differentiation of better and worse is found in the manner of thought and expression. Acquaintance with the best that has been thought and said is an aid to the discrimination of the better, and the acquisition of such acquaintance should be an early stage in the study of the humanities.

Judgment of values and communication concerning them depend upon *analysis*. Teaching in the humanities is a process of analysis of modes of expression and their contents, and it is directed toward forming in the student an ability to distinguish the characteristics to which he reacts in a work of art and to choose significant characteristics for attention. In its simplest form it substitutes for that enjoyment of music in which sounds form a background for trains of reflection on other matters—interrupted by nervous starts when the music intrudes on attention—an ability to distinguish the characteristics of harmonic, melodic, and rhythmic development which constitute music. Pictures or poems or novels may be pleasant because they recall scenes of youth, depict remembered personalities, retell familiar stories, reinforce favorite prejudices, or stimulate unexamined physical or organic reactions, but they also have qualities which differentiate great art from what happens to be tolerated or accepted. Unexamined ideas are dangerous, and unanalyzed arguments may be persuasive for many reasons besides their possible soundness.

Appreciation and analysis are the recognition and examination of embodiments of values which are treated explicitly in the arts of the humanities concerned with *criticism*. Any excursion into the discussion of modes of expression and their uses, arts and their forms, tastes and their circumstances, ideas and their formulations, will suggest means of analysis and grounds of appreciation. But it will also, if it is slightly extended, disclose conflicting standards and an unresolved multiplicity of objects and purposes in analytical schemes. Teaching in the humanities must employ a process of analysis which is committed to critical standards and methods, and it should make the student aware of his own critical commitments, provide him with the means of setting them forth, and acquaint him with the basic assumptions of other critical systems.

These three objectives toward which the arts of the humanities are directed determine the content of courses in the humanities in general education. They also provide a means of determining the attitude, the subject matter, and the knowledge characteristic of the humanities. Early in the course of humanistic studies in general education, attention should be given to inducing that wide acquaintance and stimulating that lively interest which are the mark and consequence of appreciation. The course should involve wide reading and encouragement to follow the lines of one's interests in cutting across the great achievements of the past. But

the processes of analysis should soon be brought to bear on the development of interest and taste, for the breach between art and life can be crossed only by raising the level of interest to what is great, not by denominating art that which is part of life and an object of interest. While it is true that education must take advantage of the interest of the student, it is not education if it has no effect on that interest except to reinforce it and adjust it to the current interests of the times. Whether viewed as a problem of appreciation or of adjustment, the problem of education depends on a choice of values. Appreciation of the great achievements of man is adjustment to the best that has been said and thought, but it is maladjustment to the conversations, tastes, and aspirations of any times. Adjustment to the interests of the times, when those interests fall short of the best, is a cause of malaise, discontent, and uncertainty when the momentary pleasure is interrupted or its source threatened. Maladjustment of the first kind may be the stimulus to innovation in the arts, to search for understanding, and to establishment of confidence. Appreciation need not mean today, as it did not mean in the periods of humanistic renewal and rebirth, a static and passive contemplation of the past: it could discover a content for the new media of mass communication; it could contribute to mutual understanding in a world divided by conflicting ideologies and antagonistic cultures; it could contribute to the confidence that comes from common understanding and shared aspirations. The humanistic attitude has taken many specific forms, but in all forms it is an attitude of appreciation.

Analysis is based on appreciation and makes explicit the grounds of appreciation. It depends on close reading, in which attention is turned to the problems in the various branches of art and literature and the means by which they are solved. The second stage of humanistic studies in general education should consist in training in the modes of analysis that bear on the arts. Thus in the study of literature the student should consider the problems presented by the related forms of expression. Histories illustrate the problems of narrative statements adequate to set forth a series of events or the character of times. Rhetoricians frequently use historical materials for purposes of persuasion, as Paine and Burke made opposed uses of the history of the French Revolution, and their speeches and writing are data for treating the problem of the effect of statements on the attitude or actions of people. Philosophical writings are efforts to construct statements of argument adequate to the nature of things beyond the evidence of any particular set of events. This philosophic purpose is sometimes achieved in dialogues, which are similar in form to the drama, but dramatic unity and effectiveness are achieved neither by philosophic truth nor by historical accuracy; and the drama differs, in turn, from the novel or the lyric poem or the work of science. The use of analysis in education is to teach the student to read pertinently to the problems posed in what he reads. Once he has learned to read histories with respect to the problems which histories undertake in varying ways to solve, and to read philosophy as philosophy and poetry as poetry, he should examine the ways in which history may also be read as poetry, drama as philosophy, and science as propaganda. The arts of analysis are guides through the intricacies of these interrelations of meanings and values and these shifts of interpretations. The genres and kinds of art and literature are the result of such analysis, and they are no less real or definite for the fact that there is no fixed classification of genres, since they depend on analysis, on interpretation, and on purpose. The kinds of art, so determined in analysis, are the subject matter of the humanities.

Criticism is applied in analysis and organizes analysis about a coherent conception of art. The object of art may be viewed as a bewildering variety of things: a form impressed on a matter; a content expressed in a medium; a whole composed of parts; an expression of an intention; a communication between artist and audience; an imitation of an object, an idea, or a previous model; an embodiment of a value; a sign of the times; an instrument of moral, economic, political, or religious advance; a statement of truth—and for each of these views a system of criticism and a mode of analysis may be constructed. The third stage of humanistic studies in general education should make explicit the critical grounds of analysis and should explore the diversities of critical approaches.

This exploration should embrace four elements which tend, when they are not considered in relation to one another, to assume fundamental and unique importance in the development of critical systems. The potentialities and the uses of the medium, including its symbolic significances, its adaptability to content, and its effectiveness on the sensitivities of audiences, are

the source of critical principles. These were formulated for the medium of language in the liberal arts of grammar, rhetoric, and dialectic; they have recently received psychological development and extension in the semantics of I. A. Richards[4] and the strategies and dramatism of Kenneth Burke.[5] The resources of cultural history, in the second place, make available critical principles for the recovery of significances and values which words or actions had for the author and which are essential for the understanding and reconstitution of his work as a work of art; the work of John Dover Wilson[6] on Shakespeare and of John Livingston Lowes[7] on Coleridge are divergent efforts to recover significances. The recovery of significances, however, leaves untouched the problem of discovering values, and the effort to differentiate and identify the values achieved in a poem makes use of critical principles for the discovery of literary form and achievement; the principles and criticism of R. S. Crane[8] and the Chicago school are directed to the discovery of values. Finally, the problems of the analysis of ideas and the appreciation of intellectual differences make use of critical principles suited to ideas in the arts; A. O. Lovejoy[9] and Marjorie Nicholson[10] have directed their studies of the key ideas to the treatment of these problems. In these various forms, knowledge of language and symbols, of history, of artistic and literary forms, and of structures of ideas have been employed in criticism and analysis: these are the forms of knowledge employed by the humanities.

### IV. THE TECHNIQUES OF TEACHING

Inquiry and teaching in the humanities may thus be described in terms of the characteristics of the works of men about which the problems of the humanities center. This does not mean that the teaching is "formal" in the sense of withdrawing art from the context of life or secluding it from the application of the scientific method. Scientific method is a means of testing statements and operations relative to problems, and the social or biological context of anything is determined by statement and operation. The humanistic techniques of appreciation, analysis, and criticism are distinct from the techniques by which the work of art is treated as a consequence of biological or psychological behavior or as a social phenomenon. But the humanistic techniques are neither more nor less formal than the techniques of the natural sciences or the social sciences, nor are scientific techniques in the narrow sense adapted to accomplish the purposes for which humanistic techniques are employed. The latter go beyond words and forms, not to explore the organism, the psyche, or the social structure, but to discover the values which the words express or the form contains and to inform the student's mind with habits and skills modeled on the achievement of those values. There is no subject matter which is not susceptible of scientific analysis, and there is no statement or action which is uninfluenced by social forces or wholly devoid of social implications. In like fashion, there is no human product or construction which is not a proper subject of semantic, historical, aesthetic, and philosophical criticism by application of the humanistic arts.

No program of education is foolproof in execution or ambiguous in formulation, but, in so far as attention is

[4] *Principles of Literary Criticism* (New York: Harcourt, Brace & Co., 1925); *Practical Criticism* (New York: Harcourt, Brace & Co., 1929); *The Philosophy of Rhetoric* (New York: Oxford University Press, 1936); *Interpretation in Teaching* (New York: Harcourt, Brace & Co., 1938).

[5] *The Philosophy of Literary Form: Studies in Symbolic Action* (Baton Rouge: Louisiana State University Press, 1941); *A Grammar of Motives* (New York: Prentice-Hall 1945).

[6] *What Happens in Hamlet* (Cambridge: At the University Press, 1935).

[7] *The Road to Xanadu: A Study of the Ways of the Imagination* (Boston: Houghton Mifflin Co., 1927).

[8] "History vs. Criticism in the University Study of Literature," *English Journal*, XXIV (1935), 645–67; "Texts and Ideas," *College English*, II (May, 1941), 755–65; R. S. Crane, N. F. Maclean, and Elder Olson, "Prefatory Note" and "Two Essays in Practical Criticism," *University Review*, VIII (spring, 1942), 199–219; "Cleanth Brooks: The Bankruptcy of Critical Monism," *Modern Philology*, XLV (May, 1948), 226–45; "I. A. Richards on the Art of Interpretation," *Ethics*, LIX (January, 1949), 112–26. Cf. Elder Olson, "An Outline of Poetic Theory," *Critiques and Essays in Criticism, 1920–48*, ed. Robert W. Stallman (New York, 1949), pp. 264–88.

[9] A. O. Lovejoy and Others (eds.), *A Documentary History of Primitivism and Related Ideas* (Baltimore: Johns Hopkins Press, 1935); *The Great Chain of Being: A Study of the History of an Idea* (Cambridge: Harvard University Press, 1936); *Essays in the History of Ideas* (Baltimore: Johns Hopkins Press, 1948).

[10] *Newton Demands the Muse* (Princeton: Princeton University Press, 1946).

centered on the works of men, the dangers incident to classroom performances are minimized. However bad the teaching or tangential its purposes, if the student is brought into contact with great works of literature, philosophy, science, art, and social speculation and contrivance, he will be started on that movement to the *more human* which is the mark of humanistic education. Plato, Aristotle, Dante, Shakespeare, Newton, Mozart, and Cézanne are teachers in their works, and the dangers to humanistic education are to be found in the obstacles that are placed in the way of their teaching. These obstacles range from devices to discourage the interest of the student to methods of treating the arts assiduously and exhaustively without permitting the object of art to emerge in the field of attention. Teaching in the humanities employs the techniques of the arts of appreciation, analysis, and criticism to facilitate the proper teaching contained in the work.

Lectures have their use in inspiring appreciation, stimulating interest, or supplying background information. They are particularly effective when they present steps of analysis and criticism in application to problems. But their evil effects outweigh their advantages in many of the forms in which lectures are in themselves most interesting. The adventures of the lecturer among great expressions and thoughts have an inhibiting effect on education when the student is unable to discover like values in like works, either because he has not learned how or because the values are in the lecturer's mind rather than in the work of art. The interest which is stimulated by the lecture may be tangential to the achievements of men, and the stimulus to reading and inquiry may lead the student not to history, or art, or philosophy but to the detective work which scholarship carries out concerning persons, documents, and actions connected with them. The lecture may lose the student in the maze of background materials, much of which the student could learn to discover for himself if he acquired familiarity with the field and ability to analyze the problem. The lecture-conference, in which the exposition is determined in part by the questions of the students, is a device by which to insure that the lecture conserve something of its analytic form and appreciative purpose.

The explication of texts affords training in analysis. The examination of the work in class is a means of discovering and removing the difficulties which the student had in examining and interpreting it. The analysis may take many forms: a close examination concerned with meanings of terms, linguistic forms, modes of development, and style; or it may go to historical data and to other documents or material evidence to recover historical significances; or it may deal with the larger structures of the work and the values which they embody or the intellectual issues which they present.

Discussions may be employed to explore the issues in criticism which are encountered in the analysis of works. The inquiry may depart from the text to examine the alternative interpretations that are possible, or the principles and consequences of interpretations that have been made, or the criteria implicit in the analysis and their application. Problems of linguistics, history, aesthetics, and philosophy, in their broad humanistic aspects, arise naturally from such specific inquiries.

Finally, training in the techniques of expression and communication may be guided by the achievements analyzed in the great examples of expression. There are no normative rules for the use of language or any other medium if the standard of use is taken from what is, in fact, understood or accepted. But, if the uses of media are examined in what men have said and made, differences of purposes and degrees of effectiveness in the realization of those purposes can be discriminated. The training by which a student learns to express correctly what he has to say, to adapt his statement to circumstances and purposes, and to organize his arguments clearly and cogently should be closely related to his analyses of the qualities which make great works clear in statement, effective in presentation, and sound in demonstration.

If these techniques of teaching accomplish their purpose of centering attention on the great works of man, they will contribute to combating the two opposed dogmatisms which are applied to education and to all other issues today. Appreciation, analysis, and criticism are incompatible alike with a dogmatism of doctrinaire commitment to a body of truth or party line which makes superfluous any rigorous examination of specific statements or works to check the accuracy of what is alleged to be true of them, and with a dogmatism of doctrinaire commitment to a view of a subject matter—whether it be a language or the social environment or the needs of the student—which makes irrelevant or

unreal any other aspect of the statement or work than those accessible in that subject matter.

There are three ways in which a student may be adapted to his environment and equipped for life which correspond to these three forms of instruction in humanistic subject matters. The first is an education adapted to the environment of a predetermined doctrine in which caution and fear are the chief motivations and inconspicuous conformity the chief virtue. The second is an education adapted to the environment of actual associations and values, in which acceptance, security, and accumulation are prominent virtues. Fundamentally these dogmatisms are involved in the same error, and in both the humanities are transformed and eliminated; for conformity to an authoritatively imposed doctrine will level off differences and destroy criticism, while identification of values with what is actual, or what is novel, or what was once valued involves a doctrine which assimilates norms to something else and levels off differences.

The teaching of the humanities, as opposed to these two forms of reduction, can equip the student for life in an environment which includes the best that men have said and done. It can assist him to acquire that freedom of spirit which has animated the formation of all great civilizations. It can prepare him for life, not by securing his adherence to a doctrine which has little chance of universal application, general acceptance, or indefinite survival, or by persuading him of the scientific character of analytical devices which have their roots in what is viewed as basic in man or in the present situation, but by giving him practice in arts which are adapted to problems by analogy to the successful treatment of like problems. It is not a secure life in the sense that it teaches him how to adhere to his party or to fit his community, but it is secure in the values on which it is based and the satisfaction which those values can bring, and it has its secondary utilities in the influence which such arts and abilities might exert in the development of democratic techniques of discussion, in the formation and operation of parties and associations, and in the transformations possible in the communities of men. Such reorientations of values are essential to the solution of the problems of our times as well as to the achievement of the good life.

# *Anthropology in the General Social Science Course*

JULES HENRY*

THE FUNDAMENTAL assumption of this paper is that the general social science course should treat human society as an integrated whole. This is in contradistinction to separate treatment of its part-functions, such as economic life, political life, etc., which is what the particular social disciplines give. But treating society as a whole in general social science should not mean summarizing its parts. It should not mean presenting short analytical descriptions of society's part-functions. This has frequently been done in general courses in social science, and it is doubtful whether such courses can give introductory students in the social sciences a view of society as an interrelated totality.

To an individual living in society his behavior does not appear to be made up of separate departments into and out of which he passes in his daily life. The simple act of buying a dress is a complex act, the separate parts of which might conceivably be treated under the headings of economics, history, social psychology, sociology, and cultural anthropology. Yet the act itself is, at the instant of its performance, an indissoluble whole, which must be understood in its totality. The social process is comparable to this individual action and therefore needs to be studied as a whole.

It is true that much insight is obtained from the particularistic treatment of phenomena by the separate social disciplines. But, in relation to the student, I see this as an enrichment of experience at later stages of undergraduate study of the social sciences. At the introductory level I see the awareness of totalities as an exceedingly important objective in the teaching of social sciences.

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## THE FUNCTION OF ANTHROPOLOGY IN GENERAL SOCIAL SCIENCE

Cultural anthropology is, among other things, a tool for the study of cultural wholes. Cultural anthropology has emphasized the need for understanding total situations and has, therefore, within its own body of material and theory, rejected the idea of exclusive preoccupation with part-functions. This does not mean that cultural anthropology has not had fruitful concern for particular aspects of the social process. It does mean, however, that the dominant emphasis in cultural anthropology has been on the importance of study of the social totality in all the complexity of its manifold interrelations.

Since the dominant emphasis in anthropological thinking has, in recent decades, been of this character, it follows that cultural anthropology *ought to be* an ideal methodological instrument in the general social science course. This means that in such courses anthropology is not to provide only "background" material on "cultural relativity," "primitive culture," race, diffusion, and other data from anthropology. While such material is, of itself, an important contribution to social theory it should be emphasized again that in addition to this is the contribution which anthropology can make as a methodological tool in the analysis of the interrelations that exist among all of society's part-functions.

Since a general social science course cannot confine itself to the study of primitive culture, anthropologists in the general social science course will not be serving at their highest level of efficiency if they limit themselves to the "primitive." Hence anthropologists, if they are to make a maximum contribution in such a curriculum, will need to familiarize themselves with

other social disciplines. While this seems necessary in terms of the objectives of general social science, it will also be personally rewarding to the individual anthropologist. There is no phase of cultural anthropology which may not be enriched through the scholar's understanding of the processes and materials of contemporary world culture.

Anthropology, as a member of the collaborating team in a social science program, must help to develop concepts which will be of general use throughout the social process everywhere. While it is true that knowledge of contemporary world culture is important to an anthropologist teaching in the general social science course, development of new concepts is also necessary. This will become apparent when we realize that, valuable as many anthropological concepts are, the discipline of anthropology meets with certain obstacles of a theoretical nature in attempting to understand and analyze contemporary culture simply through the tools of traditiona[1] anthropological analysis. I give below a few of the problems of American culture which seem to me to be not readily understandable in their totality through the concepts of cultural anthropology: (*a*) the shift in America from agriculture to industry; (*b*) urbanization; (*c*) exhaustion of natural resources; (*d*) development of monopoly; (*e*) development of trade-unions; (*f*) development of regionalism in the United States; (*g*) rise of constitutional democracy; (*h*) the problem of state versus federal power; (*i*) shifting ideologies.

It is, of course, true that these problems are not dealt with in the totality of their interrelations by the separate social disciplines either. Meanwhile, the treatment of social problems as particularistic isolates of separate disciplines leaves the social process inadequately understood.

### THE CHARACTER OF THE CONCEPTS IN THE GENERAL SOCIAL SCIENCE COURSE

The pedagogical problem demands that, at the outset, concepts be elementary and understandable at the Freshman level. A concept which needs, for its understanding, preliminary training in psychology, economics, or some other social discipline will not be fully grasped by many. On the other hand, the fact that a concept is elementary in nature is often of inestimable value in science.

The need to treat culture as a whole requires the development of a system of principles that can be demonstrated to be useful throughout the social process. In this situation the laws of economics fail us, for they are applicable only within the internally consistent framework of economic theory as it applies to our own culture. The principles of traditional sociology have greater utility, but they also need to be supplemented by concepts of greater range. Anthropology's most useful theoretical tool is still the concept of the cultural whole, but this has limits in the sense that it tends to stop short with description.

The concepts of general social science, since they must hold throughout the social process, must be very general. They should have the simplicity of postulates. I give below brief discussions of two such postulates at present in use in the basic social science course for Freshmen at Washington University—the concept of limits and the concept of maximation, stabilization, and decline.[1]

*The concept of limits.*—Phenomena are limited in their development or activity. They are limited by factors inside and outside themselves, viz., by external and internal factors. Thus the stature and weight of the body are limited by the general chemical composition of the body (internal factors) and by nutrition (external factors). The restrictive action of the factor may be either partial or complete. To continue with our example of the human body, the genetic composition of the body partially determines growth; but other factors, such as nutrition, affect growth also. On the other hand, the general character of the body—i.e., that it shall be human, equipped with two eyes, two arms, etc.—is limited entirely by the nature of the genes.

We have now established the following propositions: (1) Phenomena are restricted (i.e., limited); (2) they are limited by specific factors; (3) these factors may be either external or internal; and (4) the restriction brought about by the limiting factors may be either partial or complete.

The concept of limits has wide utility in the study of society. Environment, social organization, and even culture as a whole can be studied from the point of

[1] A discussion of discontinuity, another such concept, was published in the *Scientific Monthly*, LXVI, No. 3 (March, 1948), 248–54, under the title, "Discontinuity and the Shadow of the Past."

view of their limiting effects on human behavior. There is, indeed, no aspect of social life in which considerations of limits are not relevant.

*The concept of maximation, stabilization, and decline.*—All social phenomena capable of growth reach a point in their development at which they cease to grow. They may then either become stabilized at the point of maximum development or decline. The factors that affect the process of maximation may be physiographic or social, or a combination of both. The growth of any social phenomenon is limited. The point at which the limiting factors stop the growth of the phenomenon is the point of maximation.

Stabilization is the condition of a social phenomenon in which it neither increases nor decreases in magnitude. This occurs where limiting factors make increase impossible but do not cause decline.

Here, again, I believe that the concept satisfies the requirements of universality of application and simplicity.

Cultural anthropology is, in one sense, the "most general" of the social sciences. It is the most general in the sense that it has never been content with studying part-functions. On the other hand, it has been one of the most particular of the social sciences in its preoccupation with the primitive. Once it shifts the weight of its "general" view to consideration of contemporary culture, the insight previously gained from the "general" view of primitive culture should be a great help in the developing of a system of concepts applicable to all culture.

### APPLICATION OF THE GENERAL PROPOSITIONS

At this point it might be well to give an example of how the points of view and theories developed in the preceding sections are brought to bear on the subject matter of social science. For this purpose I have selected the problem of what I call "multiplication and dispersion." In the discussion the reader will see (*a*) the application of the principle of limits and (*b*) the way in which the interrelationship of biological, social, and psychological factors is studied in order to give a picture of the total social process.

Two universal properties of organisms—multiplication and dispersion—are as fundamental to man as they are to any other biological form. Man as well as bacilli has the property of multiplication and dispersion, and the environment limits the extent to which these take place. However, while many organisms react to the limiting factors in the environment in a relatively mechanical way, the reactions of man are exceedingly intricate and conditioned by his culture. At times man's culture can modify the limits imposed by the natural environment. At times his reactions to the limiting factors in the environment can be caught up in a tangle of psychological consequences and political explosions. In the following paragraphs there are examined some of the aspects of man's reaction to the limiting effects of his environment.

The Kaingáng Indians of Brazil[2] were a nomadic hunting people—one of the simplest in the world. They were divided into extended families of 50 to 300 persons. It is characteristic of hunting, as it is of other production endeavors, that it is destructive of the very thing on which it feeds. So the hunting of the Kaingáng destroyed the game animals in the areas in which the Indians hunted. Any given area of the Santa Caterina forest was capable of supporting only a small number of hunters, and this for only a short time. Hence the Kaingáng had to move from place to place, and they had to split their extended families into small hunting bands. It is easily seen that in an area of relatively scarce game supply, which the forest of Santa Caterina indeed was, the hunting bands would have to move in ever widening circles and hence drift farther and farther apart from one another. The result of this was that some Kaingáng would wander so far away from the rest of their extended family that they would not see its members for years, or perhaps never again. This is dispersion of a very high order, under the influence of the limiting factors of the environment. This, furthermore, is an almost mechanical reaction to the environment. In considering the nature of human responses, however, it is not well to leave out cultural factors; and in the Kaingáng case these provide some striking insights into the psychological consequences of biological limitations.

It was a fundamental principle of Kaingáng social organization that every man must hunt with every other man in turn, on pain of grave disapproval by the neglected persons. Under conditions of extreme dispersal, however, such a rule is impossible to observe. Yet the

[2] See the writer's *Jungle People* (New York: J. J. Augustin, 1941).

Kaingáng clung to this idea, with the result that there were frequent quarrels over unfulfilled obligations. But this was not all. An important factor in the integration of Kaingáng society was the warm affective relationships among the men. It was quite usual to see them lying together, their arms wrapped around each other, for all the world like lovers in our own culture. So, too, groups of them liked to sleep close together at night. Disruption of these affective ties through dispersion was also deeply felt. The consequence was an intensification of hostility. The whole situation was made even worse through the very human Kaingáng trait of imagining that the person one failed to help was angry with one, and then acting on that assumption. Thus A would imagine that B was angry with him because A had not hunted with B. Then, when A finally met B, A would rail at B for being angry, even before B uttered a word. Thus to the environmental factor, which weakened the social organization by compelling dispersion, was added the psychological one, which weakened the organization further and produced further dispersion, through separation of the angry ones.

Thus at the primitive level the natural limits of the food supply may have far-reaching effects on social organization. It is striking that the Arapesh of New Guinea,[3] with an all-for-one-and-one-for-all social philosophy similar to that of the Kaingáng, were not torn asunder, as were the Kaingáng, by dissensions growing out of nonfulfilment of economic obligations. This was due in part to the fact that the Arapesh are an agricultural people and strictly limited in locale. Under such conditions the Arapesh could carry out what the Kaingáng could not. Since the Kaingáng had at one time been an agricultural people, it is interesting to observe how a system of social sanctions serviceable under one set of environmental conditions was catastrophic under another.

In our discussion of the Kaingáng we observed that the limit on the food supply available can be destructive of the social organization of a tribe. In our own culture, on the other hand, we note that, while food shortages may even undermine the political structure of nations, proper social organization can indefinitely postpone the limiting effects of environment. We may also observe that questions of natural limits on food supply are nowadays quickly projected into international power politics.

The ability to reclaim land through irrigation, enrichment of the soil, filling of gullies, and the proper adjustment of furrows to the contour of the land are as much achievements of social organization as they are of science, for only a well-developed social organization can make such science possible and only through the high development of social organization—modern government—can the discoveries of science be brought to bear on large tracts of land, to make them bear fruit when the natural limits, based on the natural character of the land, would have ordained that they be fallow. Actually, then, the limitations of human survival on this planet are as much a function of social organization as they are of natural environment.

I believe that the reader can see from this example, compressed from extended classroom discussions, how the student's mind is drawn to the consideration of both primitive and nonprimitive cultures from a similar point of view and how a simple heuristic device, like the principle of limits, can be used to achieve a fairly sophisticated level of analysis. The reader will also see, I hope, how the "simple" phenomenon of soil conservation is handled in a more rounded way than it might be handled, for example, even in a course in rural sociology; for in such a course our political and social organization are "taken for granted" and are not examined in themselves as special phases of the dynamics of culture.

Multiplication and dispersion can also be discussed in terms of the concept of maximation, stabilization, and decline. Such a discussion would emphasize, among others, factors determining (limiting or increasing) productivity of primitive subsistence techniques and determinants of maximum population dispersion. It would also examine factors leading to decline of productivity of farm soils in our own culture and what the effects have been.

The social philosophies of the Kaingáng and the Arapesh raise interesting problems that will be discussed below.

### ANTHROPOLOGY AND THE PROBLEM OF VALUES

It seems unlikely that any well-rounded general course in social science could make a significant con-

[3] Margaret Mead, "Sex and Temperament in Three Primitive Societies," in *From the South Seas* (New York: William Morrow & Co., 1939).

tribution to the life of the student without frank examination of problems of value. On the other hand, where this problem is not faced, value premises will creep in anyway as "hidden premises."[4]

In this situation it seems to me that anthropology stands to make a contribution to the general social science course somewhat along the following lines:

1. Decisions in regard to values cannot be made on the basis of abstract considerations alone. Values are related to the particular form of social totality in which they have their being and to what people need and feel to be their needs at the time, in terms of the social situation as a whole. One of the most significant contributions that the general social science course can make is to show that discussion of value can be clarified by reference to concrete social situations.

2. Value systems of cultures other than our own can be discussed. This will broaden the student's view of the problem of value and drive home the lesson of the relation of value premises to cultural wholes. Anthropology cannot pluck a value system out of an exotic culture and make it an American "culture trait," but it can make clear that in any culture the problem of values needs to be considered in relation to the entire complex of cultural life.

3. When value systems of cultures other than our own are discussed, these values can be examined in terms of their consequences. Thus the anthropologist can say, "In culture X the people hold the values A, B, and C. What are the consequences, in terms of the physical and spiritual well-being of the population, of the culture's attempt to live out this particular value system in daily life?"

When anthropologists place themselves in the position of being willing to examine value systems in relation to a train of *consequences*, they will have to shift from the safe ground of cultural relativism to the less secure one of judgment-making; for it is clear that when we examine values in terms of consequences for human life we must take a stand. And the stand must be made clear to the student. When we ask, "What happens to the spiritual and physical well-being of these people who hold such-and-such values?" we immediately place ourselves in the position of judges as to what *we* consider to be "well-being." But we cannot quail before such a decision; history will make it for us anyway.

Once we make a decision as to what "well-being" is, many of our colleagues will accuse us of being propagandists. To this I would reply that a value which absolutely no one could *accuse* one of having seems to me hardly worth having at all.

4. While the anthropologist may enthusiastically indorse a set of values—particularly some of the more wholesome ones of our own culture—he must make clear to the student that, since value systems are always part of a cultural totality, we cannot blithely insist that other cultures adopt our value system. There is this much good in the fact of cultural relativity: it makes us understand that a way of life cannot be lightly interfered with and that, in meeting people across the globe, we must meet them on a level of understanding that will eventually make sense to them and to us.

What has just been said does not urge an abandonment of an insistence that we must make judgments about the value systems of other cultures. It implies, however, that in our culture contacts we must seek the answer to the question, "What is physical and spiritual well-being?" in whatever particular and devious ways our neighbors have chosen to spell it out, and not insist that it be in "good old American."

[4] Cf. Gunnar Myrdal, *An American Dilemma* (New York: Harper & Bros., 1944), Appen. 2; Arnold Rose, "The Selection of Problems for Research," *American Journal of Sociology*, Vol. LIV, No. 3 (November, 1948).

# *Teaching Chaucer in Modern Prose*

R. M. LUMIANSKY*

MOST OF our colleges and universities require of their Sophomores a year's work in literature. Three different plans are widely used: the survey of English literature; the reading of works by major English and/or American writers; and the reading of works by outstanding world authors. Whichever of these plans a given school adopts, the likelihood is that Chaucer will be one of the authors read. This inclusion of Chaucer among the authors to be read in required courses poses a unique linguistic difficulty, for Chaucer's works are the only selections in the whole course which the student is unable to read easily without detailed study. It is customary among English teachers to consider Chaucer's Middle English sufficiently close to Modern English for students to cope with it in the original, but few students share this view. In the three or four weeks spent on Chaucer, the students cannot master Middle English pronunciation, grammar, syntax, and vocabulary. The tremendous number of linguistic notes which are included in school editions of Chaucer indicates that the editors of such volumes realize this difficulty. As an attempt at further support for the reading of Chaucer in the original, teachers regularly state that he must be read in Middle English to be appreciated. But these same teachers readily accept the necessity for teaching Plato or Virgil or *Beowulf* in translation, and no one urges that the Middle English *Gawain and the Green Knight* should be read in its original West Midland and Northern dialect in such courses.

Because of this linguistic difficulty, it may be profitable to examine the four closely related resulting advantages for introductory courses in teaching selections from Chaucer in a Modern English translation. It should be understood that the point of this paper applies only to "general" students. I take it to be beyond argument that in advanced undergraduate and graduate courses in Chaucer, where there is sufficient time and reason for the students to learn Chaucer's language, the text should be the original Middle English.

The first advantage is an obvious one: a much larger body of readings can be covered in the three or four weeks—usually three hours a week—devoted to Chaucer. Where the "General Prologue" and, at best, two tales can be adequately covered in Middle English, there is ample time, if the text is in Modern English, for the "General Prologue," six or seven tales, and most of the links. In fact, the student gets a far clearer notion of the *Tales* as a whole and is consequently much more impressed with the dramatic nature of the book.

Second, the instructor is able to teach the selections from the *Tales* as literature and does not have to spend most of his class time translating. Further, he is not faced with the temptation of using up, by linguistic comment, time already limited. If the text is in Middle English, many instructors will have difficulty avoiding a debate about pronouncing "Aprille" as two or as three syllables; another time-consumer is the metathesis which has come about in the word "crulle"; then there is the contracted third person singular form in the phrase "as Austin bit"; and so on. Such comment is, of course, valuable in itself, but it is hardly of primary importance in a course of this kind for students who, for the most part, will not be English majors. Those students, chiefly the future English majors, for whom such comment is necessary and meaningful will profit more if this linguistic information is given as a part of

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a course in the English language during their Junior or Senior years. With the Chaucer in Modern English for the general students, the instructor is free to analyze the tales as short stories with his class and to treat Chaucer as a literary artist rather than as a figure in the history of the English language.

The third advantage is that the students who study selections from the *Tales* in Modern English get enjoyment out of their reading, whereas, in my experience at least, the majority of the Sophomore students in a class studying Chaucer in Middle English consider their work very dull, a strange whim of the English department. Needless to say, students in the latter situation are not moved to read further in the *Tales;* rather, they keep alive the noticeably unfavorable opinion of Chaucer's work which is prevalent among the public at large. This opinion results, I think, from teaching selections from the *Tales* in Middle English to high-school Seniors and college Sophomores.

The fourth advantage stems from the fact that in many Sophomore literature courses Chaucer is the first writer studied. With the *Tales* in Modern English, the instructor is able during the first three or four weeks of the term to set the "tone" for the whole semester or year. When Chaucer is studied in Middle English, there is the inescapable necessity for spending class time in rather arduous translation and explanatory linguistic comment; little time is left for analytical discussion. Therefore, the instructor must postpone most of the job of setting up his critical criteria and of teaching "how to read" until the material under consideration can be easily read. Also, if a considerable number of the students in the class have been somewhat repelled and even baffled by the first author, Chaucer in Middle English, then the analytical job is certainly a harder one for the instructor and the class when they come to material which can be readily comprehended. When Chaucer is read in Modern English, however, the instructor can start the analyzing at the beginning of the course.

There is one other point which is pertinent: What sort of translation is best? The argument for the use of an idiomatic prose translation of the selections from the *Tales* is a strong one. Chaucer's decision to write in English rather than in Latin or French is, of course, somewhat surprising, but it is even more remarkable that the English he used is not a stiff, literary language, except where he wanted it to be. On the contrary, it is usually the direct, highly idiomatic, colloquial language of the streets; and one of the truly notable facts about the *Canterbury Tales* is that, within the rigid requirements of Middle English verse, Chaucer was able to reproduce the rhythms of natural conversation. Now a satisfactory modernization of the *Tales* should be one in which the language used creates to as great an extent as possible the effect on the modern reader that Chaucer's colloquial Middle English created on his audience. To accomplish this in rhyme, in archaic prose, or even in blank verse, I take to be almost impossible; but it can be done with idiomatic Modern English prose. And it does not follow that the idiomatic prose is any less close to the original. Of course, in such a translation rhyme and meter are lost; but, if the conversational quality of the Middle English original is approximated by the translation, both Chaucer and the *Canterbury Tales*, as well as the students and their instructor, will suffer the lesser loss.

There are, to be sure, numerous passages in the *Canterbury Tales* which are very difficult to put into idiomatic Modern English prose, or into any kind of Modern English, for that matter. Some of these passages actually "defy" translation. But, at the risk of damning the argument so far presented, I shall present an idiomatic Modern English version of one of the more difficult passages—the opening sentence of the *Tales*. Then I shall attempt some explication of this sentence in order to show that the loss for a class of unselected students who are studying the translation rather than the original is not necessarily so great as is customarily thought.

The well-known lines in Middle English read:

Whan that Aprille with his shoures soote
The droghte of March hath perced to the roote,
And bathed every veyne in swich licour
Of which vertu engendred is the flour;
Whan Zephirus eek with his sweete breeth
Inspired hath in every holt and heeth
The tendre croppes, and the yonge sonne
Hath in the Ram his halve cours yronne,
And smale foweles maken melodye,
That slepen al the nyght with open ye
(So priketh hem nature in hir corages);
Thanne longen folk to goon on pilgrimages,
And palmeres for to seken straunge strondes,
To ferne halwes, kowthe in sondry londes;
And specially from every shires ende

Of Engelond to Caunterbury they wende,
The hooly blisful martir for to seke,
That hem hath holpen whan that they were seeke.

A Modern English version follows:

When April with its gentle showers has pierced the March drought to the root and bathed every plant in the moisture which will hasten the flowering; when Zephyrus with his sweet breath has stirred the new shoots in every wood and field, and the young sun has run its half-course in the Ram, and small birds sing melodiously, so touched in their hearts by Nature that they sleep all night with open eyes—then folks long to go on pilgrimages, and palmers to visit foreign shores and distant shrines, known in various lands; and especially from every shire's end of England they travel to Canterbury, to seek the holy blessed martyr who helped them when they were sick.[1]

First, let us touch only briefly on the obvious fact that, even with only about twelve hours of class time for selections from the *Tales*, the instructor teaching this sentence in Middle English is forced to devote almost a whole hour to linguistic explanation. There are about seventeen words which have no immediately recognizable Modern English equivalents; if the metrical patterns are to be understood, there must be talk of final *e;* and the pronunciation of words like "sweete" and "breeth" demands some discussion. It is true that most school editions of selections from the *Tales* have ample explanatory notes and glossaries and some treatment of pronunciation and meter. But few instructors will want to depend wholly on the student's having learned such matters by himself, especially for the first lesson. With the text in Modern English this problem does not exist.

Next, there are two points in the sentence about which the instructor must give brief "background" information, whether the text is in Middle or in Modern English. The first has to do with the "young sun" and the "Ram": in Chaucer's time the year was reckoned from the vernal equinox, and the sun was thought to pass through the divisions of the zodiac. The other and lengthier comment should treat the custom of pilgrimages in the fourteenth century, the cult of the saints in general, and a few facts about Becket and Canterbury.

With such matters out of the way, the instructor comes to the "literary" analysis of the passage: What is the general critical opinion of this sentence? Does this opinion seem sound? What are the ideas which make up the sentence? What effect results from the combination of these ideas? Does the sentence bear any important introductory relationship to the rest of the "General Prologue" and to the *Tales* as a whole?

Many critics have commented favorably upon the sentence, most frequently because of its "poetic" nature. It appears that these critics have generally used "poetic" to refer not to the rhyme and meter but to the treatment of various aspects of the arrival of spring: April showers, plants, Zephyrus, the new shoots, the sun, the small birds. We find, however, that such descriptions of the coming of spring are not at all unusual in medieval literature; in fact, they are present even in scientific writing. In other occurrences the critics have not judged these descriptions of nature "poetic," and we are not often told why Chaucer's lines deserve the term while the similar passages do not. Perhaps "poetic" needs further qualification before it fits Chaucer's opening sentence. Lowell, in a well-known comment, said that, after repeating the sentence to himself a thousand times, "still at the thousandth time a breath of uncontaminate springtide seems to lift the hair upon my forehead." But he did not state convincingly just why this is true of Chaucer's sentence and not true of other medieval descriptions of the coming of spring.

Now the sentence is made up of two main parts—the description of the arrival of spring and the statement of the longing which people feel to go on pilgrimages. The former idea is expressed in the two *when*-clauses, and the latter in the *then*-clause; thus the relationship of these two parts of the sentence—and therefore of the two ideas that they express—is causal rather than parallel. The truth of the second part results from the truth of the first part; because of certain characteristics of spring, people in that season long to go on pilgrimages. The sentence opens with the natural world and shifts in its second part, the *then*-clause, to the world of human beings. Or, rather, the second part correctly places human beings in their relation to the natural world during a particular season of the year. And, within the world of human beings, the application is narrowed from pilgrimages in general to the specific English pilgrimage to Canterbury. "A breath

[1] Quoted from R. M. Lumiansky, *The Canterbury Tales: A New Modern English Prose Translation* (New York: Simon & Schuster, 1948), p. 1. [Editor's note.]

of uncontaminate springtide" seemed to touch Lowell's hair when he read this passage, chiefly because Chaucer specifically applied his description of the arrival of spring to the world of human beings.

Another result of the combination of ideas which Chaucer included in this sentence is that therein the purposes and implications of a pilgrimage are examined in terms broader than the usual religious ones. In its simplest form the sentence says: "When spring comes, then folks long to go on pilgrimages." The fundamental spiritual nature of a pilgrimage is not thereby overshadowed or obscured, but the significance of a pilgrimage as a social event is also given emphasis. The long, hard English winter is just over; people are tired of living indoors, feeding fires, and bundling up in heavy clothes to go outside. Therefore, when April comes, folks long to go on pilgrimages. And this statement of the social appeal of a pilgrimage—a vacation in the spring—strikes a familiar note in the experience of human beings, whatever the century or country. Then, behind this broadened point of view from which Chaucer examines a pilgrimage, there lies the whole question of man's relationship to religion (the afterlife) and to nature (this life). The implication is that most people perhaps cannot successfully deal with religion, represented here by a pilgrimage, unless the spiritual aspects of religion are modified by natural, earthly considerations, represented here by the coming of spring. Chaucer's sentence surpasses similar medieval passages mainly because in it the often used description of the arrival of spring serves to broaden and to make more realistic the purposes of a pilgrimage.

It is immediately apparent that, when so understood, the opening sentence of the *Canterbury Tales* has an important introductory bearing on the rest of the "General Prologue" and on the *Tales* as a whole. As has been frequently said, the "General Prologue" is especially remarkable because the pilgrims who are portrayed therein are real human beings. There are among these pilgrims those who, like the Parson and the Plowman, are making the pilgrimage because of sincere devotion. There are others, like the Miller and the Shipman, who seem more concerned with the vacation in the spring. But the presence of most of the pilgrims is the result of a combination of motives; for Chaucer, unlike most other medieval writers, knew enough about people to realize that unmixed black and white are colors which should seldom be used when painting living portraits. As we have seen, the first sentence of the "General Prologue" skilfully introduces the human element into the idea of a pilgrimage.

To say that Chaucer's choice of a pilgrimage as the unifying device for his collection of stories was a stroke of genius is to risk triteness. But it should be observed that the opening sentence, which places the social appeal of a pilgrimage alongside its religious significance, serves an important function in adequately preparing for the use of this unifying device throughout the *Tales*. Not only does it prepare for our meeting real rather rather than one-sided people in the "General Prologue," but it also makes us ready for Chaucer's keeping these people alive—that is, many-sided—during the pilgrimage itself by means of the links and the suiting of tales to tellers.

It would seem, then, that the excellence of the sentence we have been examining results, to a considerable extent, from Chaucer's making stereotyped elements serve a functional purpose. And it may be that the really "poetic" qualities of the sentence become apparent not from a mere listing of Chaucer's references to the coming of spring but from some such analysis as has been given above. If so, the general student need not read Chaucer in Middle English in order to appreciate him, for all the "poetic" qualities are not really lost in translation. Rather, the use of a Modern English version allows the instructor to get at these qualities more quickly and to treat them more adequately with an inexperienced and unselected class.

# *Liberal Science at Purdue: An Experiment*

ROBERT B. ECKLES*

IN THE field of general education one of the most important of contemporary problems is the introduction of general education courses in engineering and scientific institutions. General education courses in the sciences and liberal arts offer to the engineering and science student an excellent means of meeting demands for his personal orientation in his world. An experiment in teaching general education courses in an engineering and scientific university has in some degree proved successful. The experiment has been made in the Liberal Science Curriculum of the School of Science of Purdue University.

As the 1930's drew to a close, administrators at Purdue were convinced that too many of the courses given students were so highly technical and narrow in scope that students were not being properly prepared for citizenship. The departments of modern language, English, and history were used to a great degree as service departments, offering specialized courses in economics for engineers, German for scientists, and business letter-writing. Not enough attention was given to the development of the student's character and intellectual interests in courses making him familiar with scientific or social problems. The administration, therefore, decided to experiment with a series of courses that would aim at preparing students both to earn their livelihood and to leave the university with some understanding of the heritage of American culture and contemporary scientific and social problems.

In part the decision to attempt general education courses arose from a feeling that leadership in industry and in the community would come more easily to graduates who were not limited in their outlook because of a lack of studies in the broad fields of the sciences and the liberal arts. After this decision had been made, the problem of the administrators was how to inaugurate a program that would provide both training in a special field of interest and courses, general in character, that would give a better overview of a traditional discipline than would ordinary survey courses.

At Purdue most women students were to be found in the school of home economics. This school was so occupied with the teaching of special skills that the introduction of an experiment was impossible. A second department of the university devoted to the training of women was the physical education department for women. However, the limited nature of the work given in this department precluded an introduction of general education courses. Finally, it was decided that the group for the general education experiment would be found among women students enrolled in the School of Science. The schools of engineering and of agriculture were so organized that general courses in these schools could not be established at the time. Within the School of Science there were departments of chemistry, biology, physics, English and speech, modern language and history, economics, and government. Many students had protested against the technical nature of several introductory courses given in the various departments. Particularly was this true in introductory courses in chemistry and the other sciences. Students interested in modern language and in teaching it in public schools or in training for library work found that an introductory course in chemistry or biology that pointed toward further and professional work in each field was not giving them essential knowledge or an understanding of sci-

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ence. The students had gone on record by asking for courses that would provide them with enough knowledge of a particular science to enable them to understand something of its role in the making of modern life. They wanted, therefore, a general and not a specific introductory course. A committee to study the problems of education for women was organized, and as a result the Liberal Science Curriculum was started in the School of Science during the academic year 1939–40.[1]

The Liberal Science Curriculum was organized in such a way that it admitted only women of exceptional ability registered in the School of Science. At the outset thirty to forty were admitted each year. These young women were given the most careful attention at the time of their selection. The criteria for selection was a showing of intellectual ability above the ordinary and a lively enthusiasm for a program that would try to orient them in the culture of the twentieth century. Courses were then organized, having as their goal the presentation of the method and discipline of science and present world problems. Courses in biology, chemistry, and physics were established with the end in view of teaching the information necessary to provide an intelligent citizen with an understanding of each subject and the role that it has played in making contemporary society what it is. In each course the students were given problems and laboratory assignments. The laboratory work was designed to illustrate the scientific method and to give point to the readings and lectures.

To the group of courses in science were added courses in contemporary history and political institutions. With these courses were included those on world literature and the literature of twentieth-century science. Also courses in aesthetics, development of civilization, economic institutions, personal finance, and a study of the changing social position of women in an industrial age were included. Each course in the curriculum was designed to give a broad understanding of the discipline—again with the object of providing the student with a means of orienting herself in a very complex world. These general courses were therefore thought of as supplying the student with intellectual brick and mortar with which she could build her life and professional career.

Courses were added leading toward a concentrated study in some field such as personnel relations, secondary-school teaching, journalism, and business administration. The courses in the special field of concentration were usually taken during the last two years in the Liberal Science Curriculum. Women who were curious about air transportation, general engineering, and other similar professional courses were assigned to classes in these fields regardless of the technical school or division. When a given program of study demanded that a sequence of courses be taken, it was followed. This was true, for example, in the cases of women wishing to take both general education courses and technical courses leading to a degree in organic chemistry or the teaching of speech. The advantage of the Liberal Science Curriculum came from flexibility in selecting courses that would correspond to the student's personal interest. It was believed that if women were allowed a wide choice in areas of concentration, they would secure a reasonable knowledge of our cultural pattern and very quickly acquire a skill that would allow them to earn their living.

In the course of the first nine years the Liberal Science Curriculum by trial and error was found lacking in its failure to give general courses in certain areas of knowledge. Because of student demand, a course in modern thought was established. Purdue, being a scientific and engineering university, did not provide for the teaching of philosophy. The course established, while not a philosophy course, was the nearest thing to it on the campus. Many felt that the demand for a course or courses in philosophy on the part of the students, particularly the veterans, was an indication of a trend in undergraduate thought favoring courses in the humanities.

In 1947 so much interest had been shown in the Liberal Science Curriculum on the part of the veterans that men who could meet the qualifications for admission were allowed to enrol. Many veterans had come to Purdue believing that studies in professional engineering were desirable or that some particular sequence of technical courses in the field of science was what they wanted. The desire to understand why they had been fighting, what modern civilization was, as well

[1] From 1939 to 1948 the Liberal Science Curriculum was developed and ably administered by Mrs. James Babcock.

as the road on which civilization was moving, were personal problems that many veterans found unanswered in their professional courses. As a result, many brought pressure on the School of Science to allow them to enrol in one or more of the liberal science courses. An unusually large number of men made application for admission to the Liberal Science Curriculum.

It was at this time that a committee was established to study the work given in every department of the School of Science for the purpose of revising the curriculum. Naturally, Liberal Science was examined with some care, and its contributions were thoroughly criticized. Criticisms of the Liberal Science Curriculum had fallen generally into two categories. First, that the whole experiment was a backward step in education because it had deserted the tradition, long established at Purdue, that specialization alone was the purpose of an engineering and scientific university. It was said that the man who wanted to read Shakespeare or study philosophy should enrol in a liberal arts college. The man interested in becoming a research chemist should attend a specialized school of science. The scientist and the engineer, so went the argument, were not interested in airy theory but were concerned only with the "practical" studies. Economics, history, English, and sociology were all right, provided that they would not take much of the scientist's time and taught him only enough to make him a better scientist. These departments were therefore labeled as "service" departments. As the veterans returned from the war, both they and many of their instructors believed that, because of the role that the engineer and the scientist had recently played, this philosophy did not correspond with the facts of life.

Along with the charge that general education was not to be tried in a science school was the opinion that general education courses and particularly those offered in liberal science were suitable for a few but certainly could not serve everyone. Those who held this opinion were usually instructors in the engineering, home economics, or agricultural schools who believed that general education courses were mad departures from normal courses, such as introductory mathematics for engineers and survey of economics for engineers. The students in the School of Science were divided in their judgment of the desirability of having general education courses. In 1949 the student newspaper in several editorials advocated an extension of liberal science courses, pointing out that this type of course could give the scientific specialist a much better understanding of his world than could the survey courses as then taught.

The final evaluation of the Liberal Science Curriculum was to be found in the role assigned it in the proposed reorganization of courses in the School of Science. The committee of the School of Science recommended in May, 1949, that general education courses be offered in place of many survey courses or technical introductory courses. These courses will be offered to students who are not majors in the particular field of science. Thus, for example, the physics major will start out with the sequence of courses designed to give him a degree in that field, but the major in English will take a physics course that is designed to give him the knowledge that an intelligent citizen should have of the role that physics plays in the making of modern culture. The success of the general education courses in liberal science, tried for nine years, is the reason for this recommendation. Following the precedent established in liberal science, students will be given a choice of general education courses in physics or chemistry, mathematics, biology, and psychology. Several courses will be established that the student must take in the field of humanities. Electives in this field will lie among such courses as the development of civilization, aesthetics, philosophy, and music appreciation. During the senior year a general education course, "Great Issues," will be given for the purpose of making the student familiar with contemporary cultural and political world problems.

In the revised curriculum of the school, liberal science will continue with most of its old functions, with some new ones added. As in the past, a limited number of exceptional students will be admitted directly to the curriculum. They will continue to take basic courses as previously outlined and will be allowed great flexibility in choosing major fields of study. Some new courses, such as a seminar for Seniors, will be added to the curriculum. Every student in the School of Science will be required to take 120 academic hours for a Bachelor of Science degree. In the Liberal Science Curriculum from 40 to 48 hours will be given over to study in a major

and a minor field of interest. The rest of the time will be spent in general education classes. Liberal science courses will be required of all students in the Liberal Science Curriculum and, in addition, will be open to any student in the university who may elect them.

Since Liberal Science tried out courses in general education, particularly in the sciences, it is intended to make the curriculum a "pilot plant" for courses that may be introduced in the School of Science. Starting with the fall semester, 1949, for example, a general course in the social sciences will be undertaken. The experiment is that of trying a four-semester integrated course in the fields of history, economics, political science, and sociology. Should this experiment prove successful, it may be adapted as a regular course in the School of Science. Liberal Science will therefore serve as a proving ground for general education courses and certainly for others. It is believed that experiments with new courses and methods of teaching will have a greater chance of success if the science school faculty tries them out in the sympathetic atmosphere of an avowedly experimental program.

The courses that may not fit into the program of one or more departments are to be given in the Liberal Science Curriculum. Thus a course such as the study of the history and literature of England would be a course not totally in the field of either history or literature. This course would be given in the Liberal Science Curriculum by instructors from both departments. When an opportunity arises, such a course would be given regularly in one or the other of the departments concerned. Courses in logic and philosophy that at the time of their introduction are not offered by established departments will also be included in the Liberal Science Curriculum. By functioning in this way, liberal science offers a chance to teach new courses cutting across traditional department lines and introducing new methods with a minimum of friction and disturbance. Staff members are given time from ordinary department assignments to teach new courses and take part in the general education experiment in liberal science. The administrative functions are carried out by a director who also is responsible for admitting students to the curriculum.

In bringing general education courses to an institution devoted to specialization and heavy concentration in limited areas of engineering and science, the liberal science experiment has been found to possess considerable merit. General education courses that were first tried in liberal science are henceforth to be taught as regular departmental offerings in the fields of social and natural science at Purdue. Liberal Science will continue as an experiment in general education where both new methods and new courses will be tried out. It has perhaps accomplished a great deal simply by pointing out how an engineering and scientifically technological university can meet the problem of providing broader and less specialized instruction for its students.

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